Service Manual

FILE No.

Cooled incubator

MIR-154

MIR-254

SANYO Electric Co., Ltd.
Biomedical Business Division

SM9910168

Effective model

This service manual is effective following model.

Model	Product code	Power source	
MIR-154	823 617 51	115V	60Hz
	823 617 52	220V	50Hz
	823 617 53	220V	60Hz
	823 617 54	220/230/220V	50Hz
	823 617 56	110V	60Hz
	823 617 61	220V	50Hz
MIR-254	823 618 51	115V	60Hz
	823 618 52	220V	50Hz
	823 618 53	220V	60Hz
	823 618 54	220/230/220V	50Hz
	823 618 56	110V	60Hz
	823 618 61	220V	50Hz

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UPON GAS LEAK REPAIR

(1) Replace compressor when you find gas leak on low pressure side, because moisture in refrigerating oil which causes refrigerating oil to be deteriorated and capillary tube to be clogged.
If there are not remain gas in high pressure stage, you should replace compressor, as well.

(2) Ensure to avoid the vacuum pump oil being flown into the refrigeration circuits. Recommended to attach the valve for the prevention.

Specifications

Structural specifications

Model	MIR-154	MIR-254
External dimensions	W700 x D580 x H1018 (mm)	W700 x D580 x H1618 (mm)
Internal dimensions	W620 x D368 x H555 (mm)	W620 x D368 x H1088 (mm)
Effective capacity	123L	238L
Exterior	Painted steel	
Interior	Stainless steel	
Door	Painted steel	
Shelf	Polyethylene coated steel wire Inner dimensions: Upper 2 pcs. W570 x D300 (mm) Bottom 1 pc. W550 x D235 (mm) Max. load: 20 kg Adjustable, 3 shelves	Polyethylene coated steel wire Inner dimensions: W570 x D300 (mm) Max. load: 20 kg Adjustable, 5 shelves
Access port	Inner diameter 40mm, left side	
Insulation	Rigid polyurethane foamed-in place	
Cooling method	Forced air circulation	
Compressor	Reciprocated compressor Output; 150W	Reciprocated compressor Output; 250W
Evaporator	Fin and tube type	
Condenser	Wire and tube type	
Refrigerant	R-134a	R-404A
Defrost heater	141W	218W
Temperature controller	Microprocessor, PID control (compressor; ON-OFF)	
Temperature display	Digital display	
Alarm	High/Low temp. alarm, independent over-heat/over-cool limiter	
Remote alarm contact	Capacity; Max. DC30V, 2A	
Memory back-up	Non-volatile memory	
Lamp	1 fluorescent lamp (FL15D) 15W	
Accessories	2 rubber caps for access port, 3 shelves, 8 clips	2 rubber caps for access port, 5 shelves, 20 clips
Weight	78 kg	108 kg
Optional components	Spacer for stacked module for MIR-154 only (MIR-S154SB) Key mounting plate (MIR-LP) Light add-on kit (MIR-L15) Shading glass protection (MIR-154BP/MIR-254BP) Communication terminal (MTR-480C)	

Control specifications

Model	MIR-154	MIR-254
Temp. setting range	-10℃ ~ +60℃ (AT:+5℃~+35℃, no load)	
Temp. uniformity	+/- 0.5℃ (SV:37℃, AT:20℃, no load)	
Temp. fluctuation	+/- 1.5℃ ON-OFF control (SV:5℃, AT:20℃, no load) +/- 0.2℃ PID control (SV:60℃, AT:20℃, no load)	
Fluorescent lamp	15W, 1pc. 2 steps switch (0 or 1)	
Program function	12 steps, 1~98 repeating or unlimited, Max. 10 programs memorized Clock mode, Timer mode, Connecting mode Starting date desirable, program reservation	
Data log function	Log interval 6min., about 14days (data cannot be memorized during power failure) Log is presented with dot per day. Older data is eliminated from log.	
Real time clock	Back-up battery for clock function, CR2032	
Upper limit alarm	+2.5℃ (+1.0~+5.0℃, changeable) Buzzer sounds intermittently and remote alarm contact turns ON. Changeable buzzer delay time Reset by pressing BUZZER key	
Lower limit alarm	-2.5℃ (-1.0~-5.0℃, changeable) Buzzer sounds intermittently and remote alarm contact turns ON. Changeable buzzer delay time Reset by pressing BUZZER key	
Independent over-heat protection	Electric protection circuit Settable range: +15~+65℃ (display unit: 1℃) Heater, fan motor, fluorescent lamp and outlet are OFF	
Independent over-cool protection	Electric protection circuit Settable range: -15~+20℃ (display unit: 1℃) Compressor is OFF	
Fan lock detection	Fan lock detectable by fan motor circuit Compressor and heater are OFF	

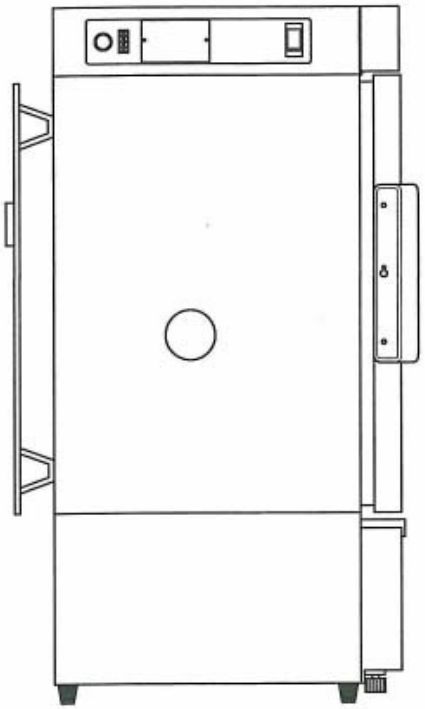
Performance specifications

Model	MIR-154					
Environmental conditions	AT:+5~+35℃, Humidity: less than 80%R.H.					
Noise level	41 dB (A scale)					
Maximum pressure	1650 kPa					
Rated voltage	AC110V	AC115V	AC220V	AC220V	AC230V	AC230V
Rated frequency	60Hz	60Hz	50Hz	60Hz	50Hz	50Hz
Power consumption	150W	160W	130W	145W	135W	140W

Model	MIR-254					
Environmental conditions	AT:+5~+35℃, Humidity: less than 80%R.H.					
Noise level	44 dB (A scale)					
Maximum pressure	2395 kPa					
Rated voltage	AC110V	AC115V	AC220V	AC220V	AC230V	AC230V
Rated frequency	60Hz	60Hz	50Hz	60Hz	50Hz	50Hz
Power consumption	220W	240W	190W	215W	195W	200W

Dimensions

< MIR-154>



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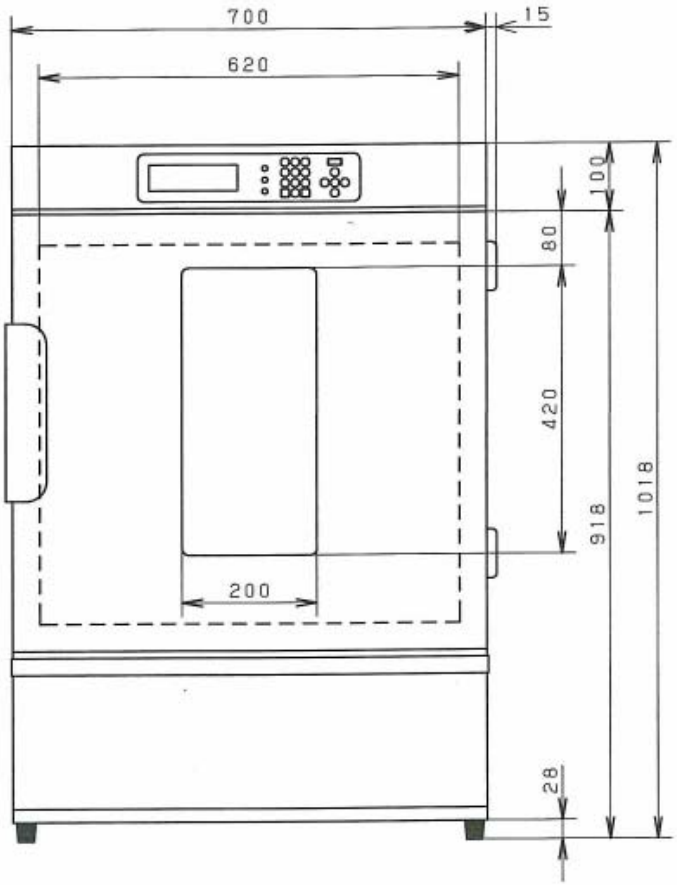

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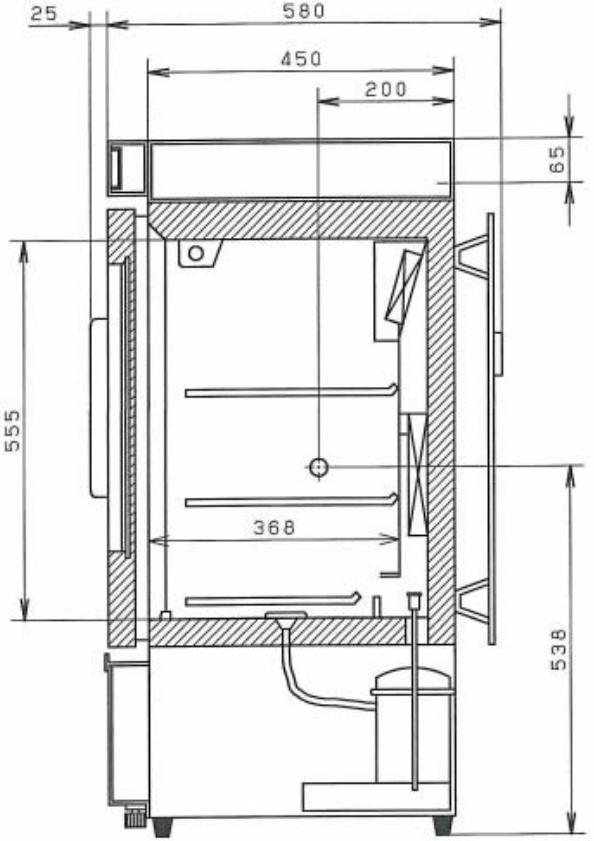

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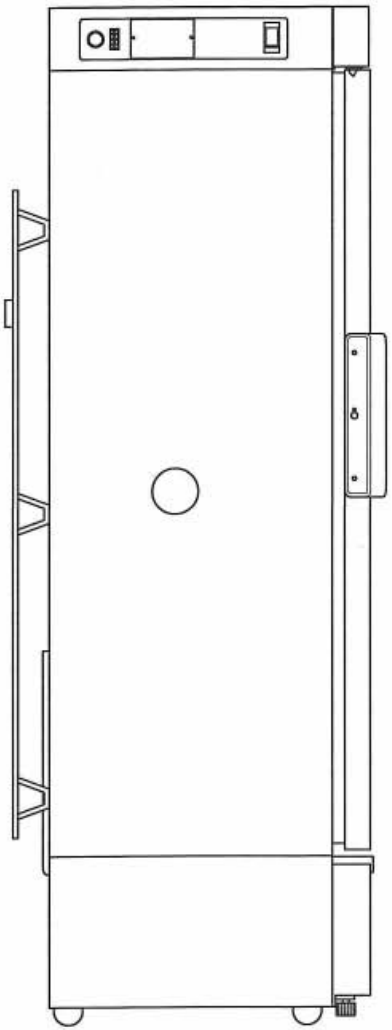

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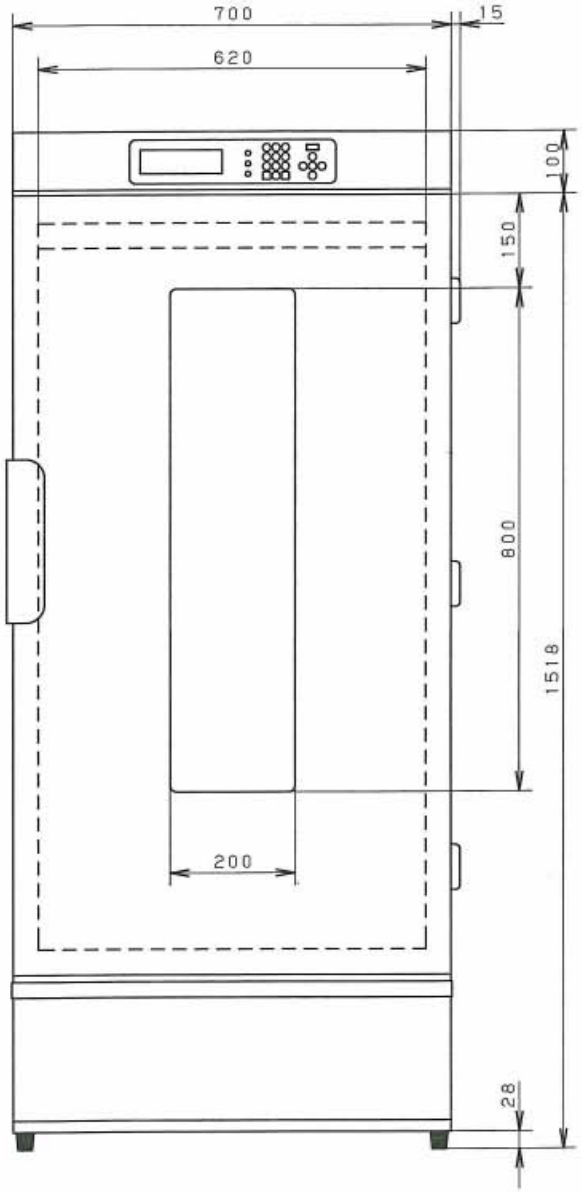

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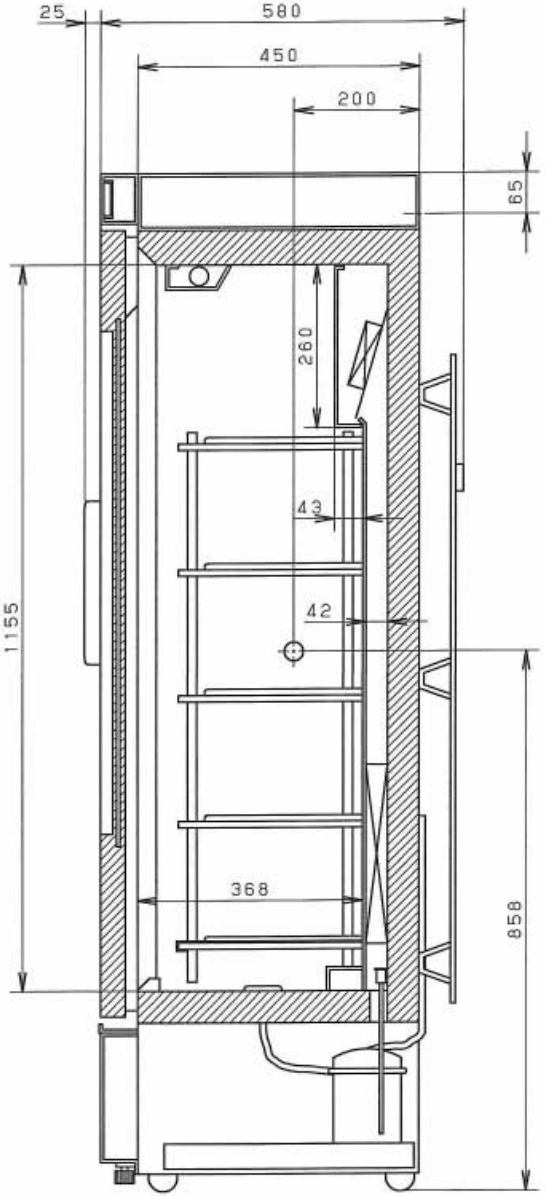

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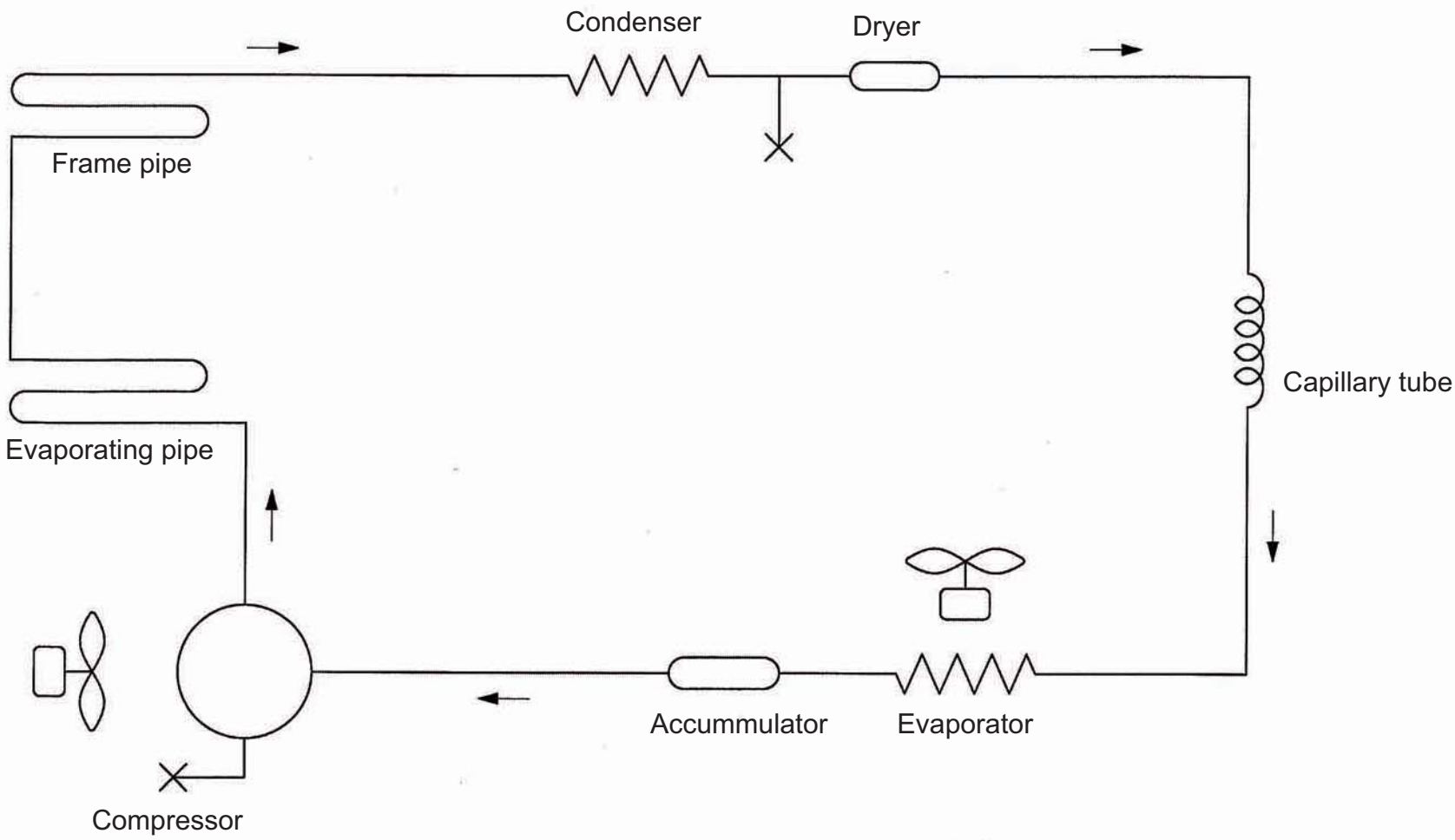
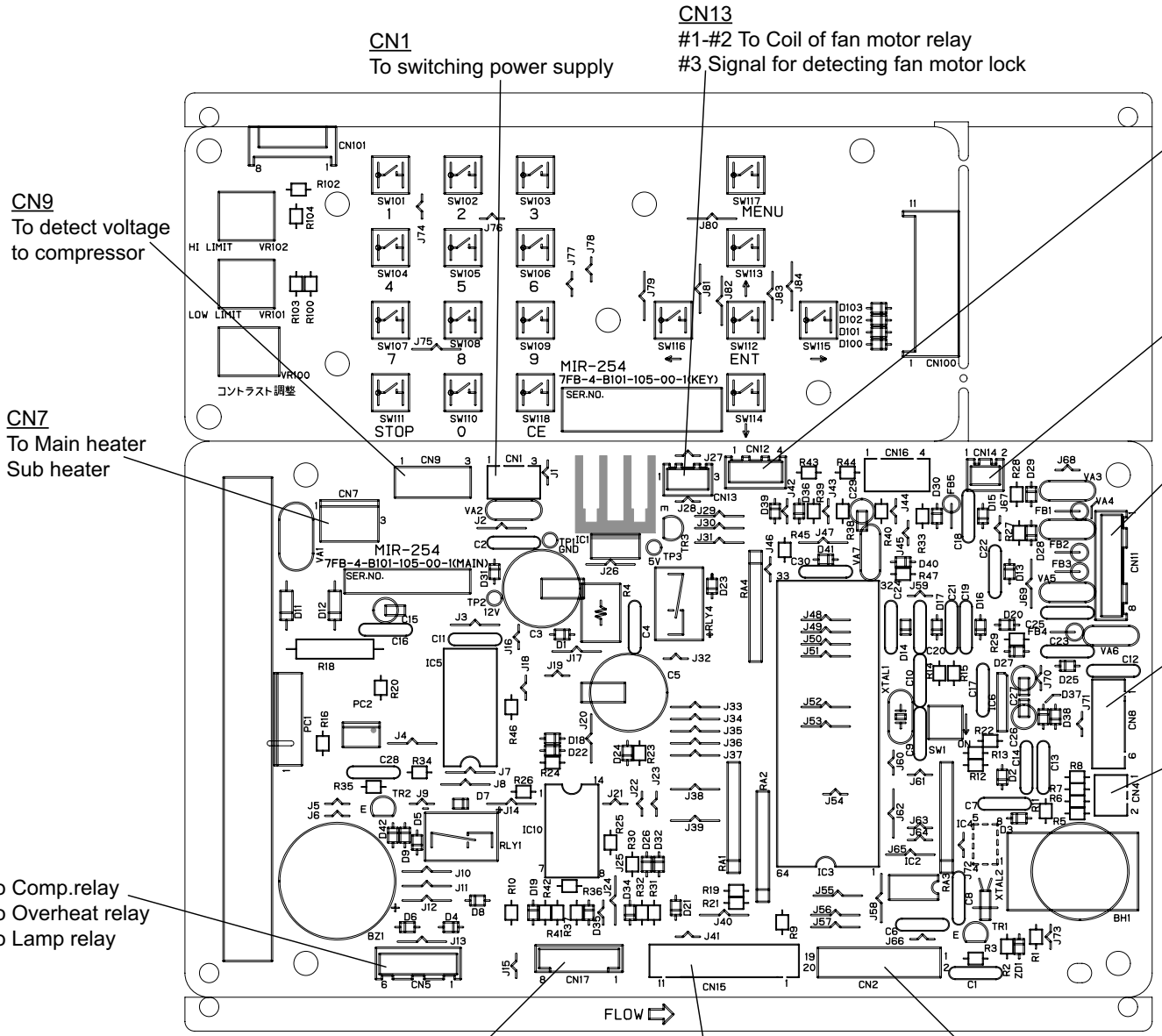
Cooling unit parts

Item	Specification	
	MIR-154	**MIR-254**
Compressor		
110/115V, 60Hz	Type: FL-1568PD Code: 7FB-0-M101-010-02 Power source: ϕ 1, 110/115V, 60Hz	Type: RL-2557PB Code: 7FB-0-M101-008-02 Power source: ϕ 1, 110/115V, 60Hz
220~240V,50Hz	Type: FL-1568SP Code: 7FB-0-M101-010-03 Power source: ϕ 1, 220~240V, 50Hz	Type: RL-2557SA Code: 7FB-0-M101-008-03 Power source: ϕ 1, 220~240V, 50Hz
220V, 60Hz	Type: FL-1568RB Code: 7FB-0-M101-010-04 Power source: ϕ 1, 220V, 60Hz	Type: RL-2557RA Code: 7FB-0-M101-008-04 Power source: ϕ 1, 220V, 60Hz
Compressor oil	Type: α 15HT Q'ty: 310ml	Type: SL32D1 Q'ty: 290ml
Cooling method	Air circulating by fan	Air circulating by fan
Condenser	Type: Wire and tube 16 columns, wire pitch 6.88, P40 W620 (ϕ 4.76)	Type: Wire and tube 26 columns, wire pitch 6.88, P40 W620 (ϕ 4.76)
Evaporating pipe	ϕ 6.0 x P30 x W240 mm (SUS316L)	ϕ 6.0 x P30 x W240 mm (SUS316L)
Frame pipe	ϕ 4.0 x T0.5 (L=3.7m)	ϕ 4.0 x T0.5 (L=4.9m)
Evaporator	Type: Fin and tube ϕ 8.0 x P25 x W500 mm 8 columns x 1 line Fin: P10 x 45pcs.	Type: Fin and tube ϕ 8.0 x P25 x W500 mm 8 columns x 1 line Fin: P10 x 45pcs.
Accumulator	ϕ 25 x L250	ϕ 25 x L250
Capillary tube	Resistance: 122 PSI Length: 2000 mm Outer diameter: ϕ 1.8 mm Inner diameter: ϕ 0.8 mm	Resistance: 122 PSI Length: 2000 mm Outer diameter: ϕ 1.8 mm Inner diameter: ϕ 0.8 mm
Refrigerant	Type: R-134a Charged q'ty: 90g	Type: R-404A Charged q'ty: 125g
Dryer	Type: 4AXH-9 Charged q'ty: 8g	Type: 4AXH-9 Charged q'ty: 8g
Comp. fan motor	(for 110/115V) FL2-011B1MP (for 220~240V) FL2-012BM5P ϕ 100, 4 blades Output: 1W Material: ABS	(for 110/115V) FL2-011B1MP (for 220~240V) FL2-012BM5P ϕ 100, 4 blades Output: 1W Material: ABS
Circulation fan motor	Type: 9GL1212H1D01 7pcs. DC12V	Type: 9GL1212H1D01 7pcs. DC12V
Thermal protector	Bimetal thermostat Type:TH-2	Bimetal thermostat Type:TH-2
Heater	Drain pan heater: 19.1W Main heater: 122W	Drain pan heater: 19.1W Main heater: 122W Sub heater: 72.3W

Refrigeration Circuit



Components on PCB



Connections on PCB

The following shows the connections of connectors on the control PCB.

Connector	Connects to	Usage
CN1	Switching power supply	To supply the power to PCB.
CN2	Network interface	To connect to MTR-480（option）
CN3	Remote alarm terminal #1: COM. #2: N.O. #3: N.C.	Remote alarm contact outputs. In normal condition, open for #1-#2 and closed for #1-#3.
CN4	#1-#2：Temp. control relay #3-#4：Heater relay	To control internal temperature (12VDC) To supply the power to Cap. tube heater (12VDC)
CN5	#1-#5: Switch PCB #6-#7: Buzzer	To connect to each switch
CN6	Display PCB	To connect to each LED
CN7	#5-#6: AT sensor #7-#8: Filter sensor #9-#10: Cascade sensor	To detect the ambient temperature To detect the temperature in condenser outlet pipe. To detect the temperature in cascade.
CN8	#1-#2: Battery （#1:6V　#2:Battery switch）	To supply the power during power failure
CN9	#1-#2: H. Comp. relay	To control compressor H ON/OFF (12VDC)
CN10	Unused	
CN11	#1-#3: Temp. sensor	To detect the internal temperature.

Electric parts

MIR-154	Specification	110/115V, 60Hz	220~240V, 50Hz	220V, 60Hz
Compressor	Type	FL-1568PD	FL-1568SP	FL-1568RB
	Code	7FB-0-M101-010-02	7FB-0-M101-010-03	7FB-0-M101-010-04
	Power source	ϕ1, 110/115V, 60Hz	ϕ1, 220-240V, 50Hz	ϕ1, 220V, 60Hz
	Winding resistance (C-R)Main	2.58Ω	11.4Ω	10.3Ω
	(C-S)Aux	5.44Ω	19.5Ω	11.0Ω
PTC	Type	P5R0SAT	PGR0SAT	PER0SAT
	Resistance(25℃)	5.6+1.0(-0.9)Ω	33±6.6Ω	22±4.4Ω
Overload relay	Type	4.0C36C1	2.0C36C3	2.0C36C3
	Action to temp. (No current)OFF	130+8(−9)℃	130+8(−9)℃	130+8(−9)℃
	ON	60+7(−5)℃	60+7(−5)℃	60+7(−5)℃
	Action to the current	12.2A	7.6A	7.6A
	Operation time	10±4 sec	10±4 sec	10±4 sec
Starting capacitor	Rating	120μ、160V	60μ、300V	60μ、300V
Circulation fan motor	Type	9GL1212H1D04	9GL1212H1D04	9GL1212H1D04
Comp. fan motor	Type	FL2-011B1MP	FL2-012BM5P	FL2-012BM5P
	Rating	AC110V	AC230V	AC230V
Comp. relay	Type	G4F-11123T	G4F-11123T	G4F-11123T
	Contact capacity	DC12V、20A	DC12V、20A	DC12V、20A
Overheat relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Contact capacity	12V、10A、250V	12V、10A、250V	12V、10A、250V
Lamp relay	Type	G4F-1123T-US	G4F-1123T-US	G4F-1123T-US
	Contact capacity	DC12V、20A、250V	DC12V、20A、250V	DC12V、20A、250V
Thermal protector	Type	TH-2	TH-2	TH-2
	Rating	125V、3A OFF:16℃ ON:8℃	125V、3A OFF:16℃ ON:8℃	125V、3A OFF:16℃ ON:8℃
Ballast	Type	FLB-1587115-	FLB-152022/23-C	FLB-152022/23-C
	Rating	15W、115V、60Hz	15W, 220/230V	15W, 220/230V
Fluorescent lamp	Type	FL15SD	FL15SD	FL15SD
	Rating	15W、D25	15W、D25	15W、D25
Glow starter	Type	FG-1P	FG-1P	FG-1P
Switching power supply	Type	ZWS30-12/J	ZWS30-12/J	ZWS30-12/J
	Output	30W、12V	30W、12V	30W、12V
Thermal fuse	Rating	250V、70℃、7A	250V、70℃、7A	250V、70℃、7A
Temp. sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Defrost sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Limit sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Comp. sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Power switch	Type	BAM215131	BAM210131	BAM210131
	Rating	AC250V、15A	AC250V, 10A	AC250V, 10A
Door switch	Type	SDKNA20700	SDKNA20700	SDKNA20700
	Rating	5V、5MA	5V、5MA	5V、5MA
Noise filter	Type	MC1220	MC1220	MC1220
	Rating	250VAC、20A	250VAC、20A	250VAC、20A

Electric parts

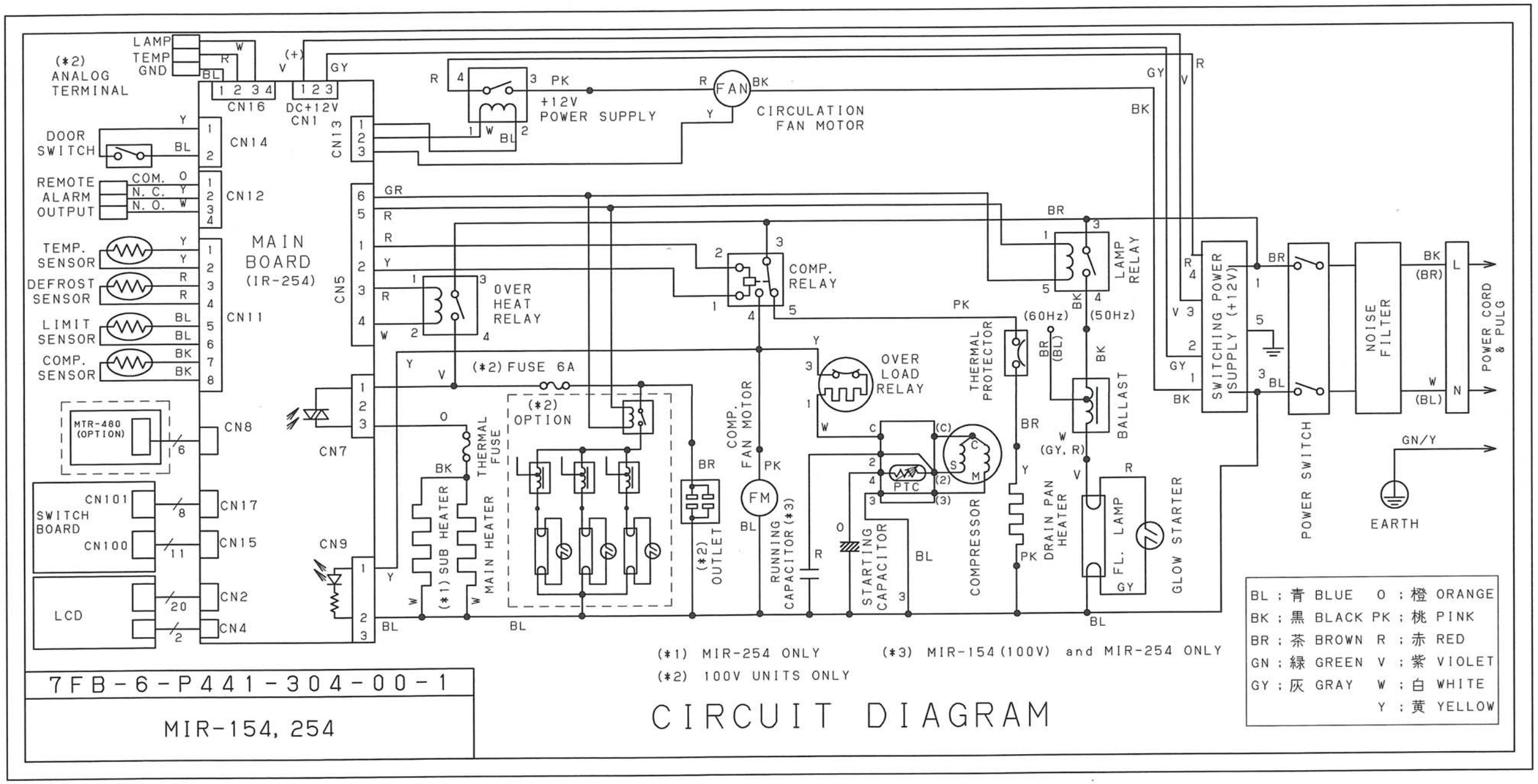
MIR-254	Specification	110/115V, 60Hz	220~240V, 50Hz	220V, 60Hz
Compressor	Type	RL2557PB	RL2557SA	RL2557RA
	Code	7FB-0-M101-008-02	7FB-0-M101-008-03	7FB-0-M101-008-04
	Power source	ϕ1, 110/115V, 60Hz	ϕ1, 220-240V, 50Hz	ϕ1, 220V, 60Hz
	Winding resistance (C-R)Main	1.32Ω	16.8Ω	13.5Ω
	(C-S)Aux	6.41Ω	9.27Ω	7.55Ω
PTC	Type	P6R0SAT	PGR0SAT	PGR0SAT
	Resistance(25℃)	6.8±1.4Ω	33±6.6Ω	33±6.6Ω
Overload relay	Type	5.0C36C1	2.8C36C1	3.2C36C1
	Action to temp. (No current)OFF	130+8(−9)℃	130+8(−9)℃	130+8(−9)℃
	ON	60+7(−5)℃	60+7(−5)℃	60+7(−5)℃
	Action to the current	13.8A	9.6A	10.1A
	Operation time	10±4 sec	10±4 sec	10±4 sec
Starting capacitor	Rating	120μ、160V	60μF、300V	60μF、300V
Running capacitor	Rating	20μ、260VAC	6μF、400VAC	6μF、400VAC
Circulation fan motor	Type	9GL1212H1D01	9GL1212H1D01	9GL1212H1D01
Comp. fan motor	Type	FL2-011B1MP	FL2-012BM5P	FL2-012BM5P
	Rating	AC110V	AC230V	AC230V
Comp. relay	Type	G4F-11123T	G4F-11123T	G4F-11123T
	Contact capacity	DC12V、20A	DC12V、20A	DC12V、20A
Overheat relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Contact capacity	12V、10A、250V	12V、10A、250V	12V、10A、250V
Lamp relay	Type	G4F-1123T-US	G4F-1123T-US	G4F-1123T-US
	Contact capacity	DC12V、20A、250V	DC12V、20A、250V	DC12V、20A、250V
Thermal protector	Type	TH-2	TH-2	TH-2
	Rating	125V、3A OFF:16℃ ON:8℃	125V、3A OFF:16℃ ON:8℃	125V、3A OFF:16℃ ON:8℃
Ballast	Type	FLB-1587115-A	FLB-152022/23-C	FLB-152022/23-C
	Rating	15W、115V、60Hz	15W, 220/230V, 50Hz	15W, 220/230V, 50Hz
Fluorescent lamp	Type	FL15SD	FL15SD	FL15SD
	Rating	15W、D25	15W、D25	15W、D25
Glow starter	Type	FG-1P	FG-1P	FG-1P
Switching power supply	Type	ZWS30-12/J	ZWS30-12/J	ZWS30-12/J
	Output	30W、12V	30W、12V	30W、12V
Thermal fuse	Rating	250V、70℃、7A	250V、70℃、7A	250V、70℃、7A
Temp. sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Defrost sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Limit sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Comp. sensor	Type	103AT-1	103AT-1	103AT-1
	Rating	10KΩ、25℃	10KΩ、25℃	10KΩ、25℃
Power switch	Type	BAM215131	BAM210131	BAM210131
	Rating	AC250V、15A	AC250V, 10A	AC250V, 10A
Door switch	Type	SDKNA20700	SDKNA20700	SDKNA20700
	Rating	5V、5MA	5V、5MA	5V、5MA
Noise filter	Type	MC1220	MC1220	MC1220
	Rating	250VAC、20A	250VAC、20A	250VAC、20A

Specification of sensor

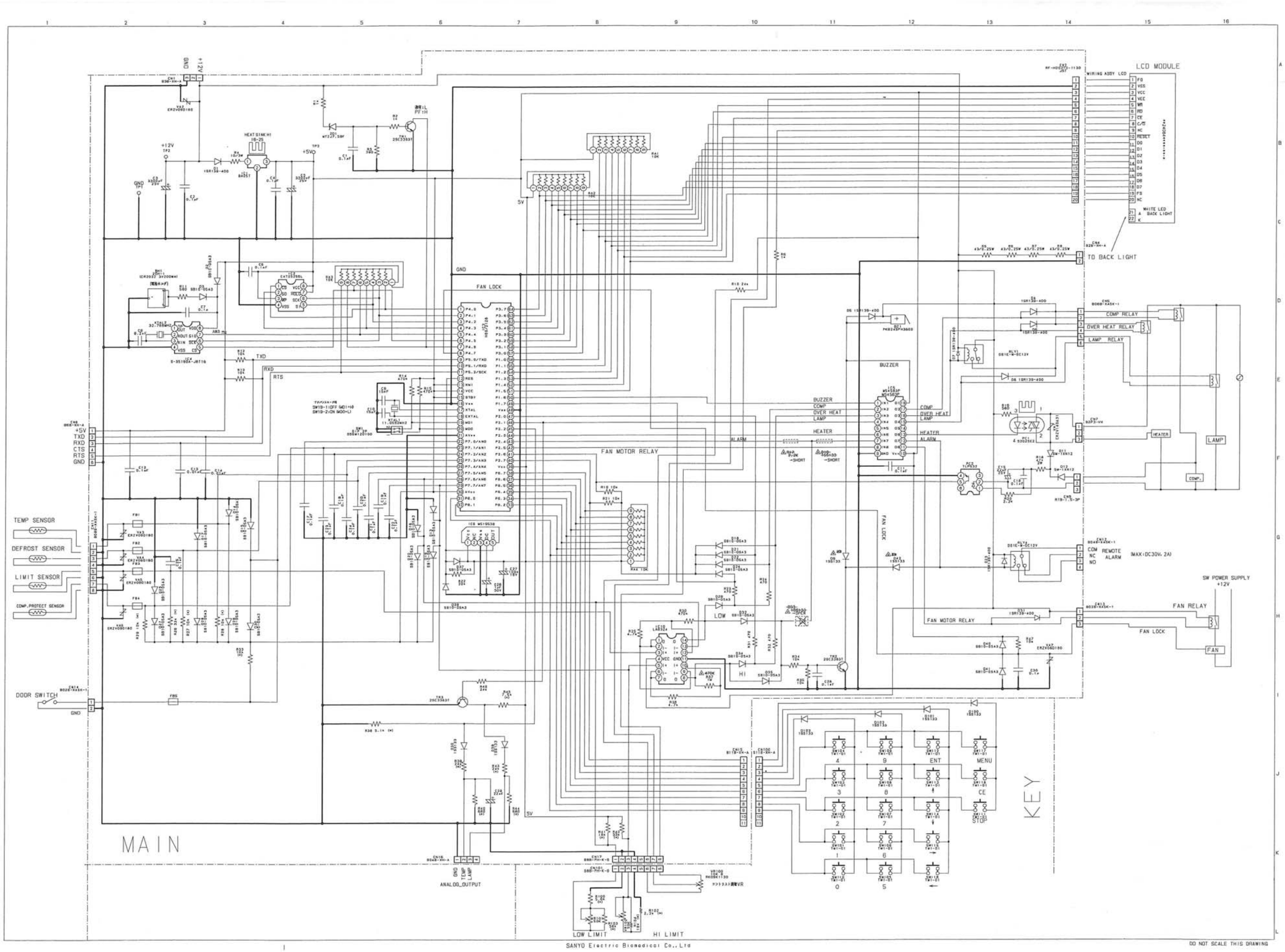
■ **Type:103AT-1**

Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)
-15	53.41	18	13.06	51	4.02
-14	50.98	19	12.56	52	3.90
-13	48.68	20	12.09	53	3.77
-12	46.50	21	11.63	54	3.65
-11	44.43	22	11.20	55	3.54
-10	42.47	23	10.78	56	3.43
-9	40.57	24	10.38	57	3.32
-8	38.77	25	10.00	58	3.22
-7	37.06	26	9.63	59	3.12
-6	35.44	27	9.28	60	3.02
-5	33.90	28	8.94	61	2.93
-4	32.44	29	8.64	62	2.84
-3	31.05	30	8.31	63	2.75
-2	29.73	31	8.02	64	2.67
-1	28.48	32	7.73	65	2.59
0	27.28	33	7.46	66	2.51
1	26.13	34	7.19	67	2.44
2	25.03	35	6.94	68	2.37
3	23.99	36	6.70	69	2.30
4	22.99	37	6.47	70	2.23
5	22.05	38	6.25	71	2.16
6	21.15	39	6.03	72	2.10
7	20.29	40	5.83	73	2.04
8	19.48	41	5.63	74	1.98
9	18.70	42	5.44	75	1.92
10	17.96	43	5.26	76	1.87
11	17.24	44	5.08	77	1.82
12	16.55	45	4.91	78	1.77
13	15.90	46	4.75	79	1.72
14	15.28	47	4.59	80	1.67
15	14.68	48	4.44	81	1.62
16	14.12	49	4.30	82	1.58
17	13.57	50	4.16	83	1.53

Wiring Diagram



Circuit Diagram



Control specifications

1. Data initialization

Following are initial values after you input '925' in Function.

Item	Initial
Stand-by temp.	: 25℃
Light	: 0 (OFF)
Span calibration	: 500 (Center of the range, 0~999)
Zero calibration	: 500 (Center of the range, 0~999)
Auto defrosting	: No
Time to start auto defrosting	: 3:00a.m. (Not displayed on LCD)
Log correction interval	: 6 minutes
Model	: 0 (MIR-154)
Communication speed (DAQ)	: 0 (2400bps)
Communication ID (DAQ)	: 0
Temp. alarm	: +/-2.5℃
Alarm delay time	: 15 minutes
Ring back time	: 30 minutes
Add-on light	: 0 (None)
Key lock password	: 0000

Note) Input following digits in Function when you reset both accumulation time for air circulating fan motor and comp. cooling fan motor.
Air circulating fan motor: 222
Comp. cooling fan motor: 333

2. Temperature control

Settable temp. range : -10.0 ~ +60.0℃
If you input '99.9', chamber temperature should be set at -30.0℃)

Settable time : 00:00 ~ 99:59
If you set at 99:99, settable time is limitless.
If you set at 99:60 ~ 99:98, settable time should be '00.00'.

Chamber temp. display range : -50.0 ~ 99.9℃

How to set chamber temp. : In Top Screen, press MENU key to step into setting mode. Set your desired value with Shift key.

Temp. control : PID

3. Overheat/overcool protection temperature

Setting range : +15 ~ +65℃ for protection from overheating
: -13 ~ +22℃ for protection from overcooling

How to set protection temp. : In Top Screen, press MENU key to step into 'std-by' and turn the volume to set.

4. Error codes

E01: Temp. sensor is disconnected
When temperature in temp. sensor is equal or lower than about -50℃, 'E01' is displayed on the Top Screen.

E02: Temp. sensor is short circuited
When temperature in temp. sensor is equal or higher than about +70℃, 'E02' is displayed on the Top Screen.

E03: Defrost temperature is abnormal

When temperature in temp. sensor is equal or higher than about +20℃ during defrosting, 'E03' is displayed on the Top Screen.

E04: SSR or comp. relay is short circuited

When photo coupler input is 'L' during heater and compressor are OFF, 'E04' is displayed on the Top Screen.

E05: SSR is disconnected

When photo coupler input is 'H' during heater is ON, heater is not conducted. 'E05' is displayed on the Top Screen.

E06: Comp. relay is disconnected

When photo coupler input is 'H' during compressor is ON, compressor is not conducted. 'E06' is displayed on the Top Screen.

E07: Air circulating fan motor is locked

When the unit detects air circulating fan motor lock during it rotates, 'E07' is displayed on the Top Screen.

E08: Compressor protection temperature is abnormal

When the temperature in comp. protect sensor is equal or higher than about +80℃ (+85℃ for MIR-254), 'E08' is displayed on the Top Screen.

When the temperature in comp. protect sensor is equal or lower than about +50℃ (+60℃ for MIR-254), 'E08' is eliminated on the Top Screen.

E09: Comp. protect sensor is disconnected

When the temperature in comp. protect sensor is equal or lower than about -50℃, 'E09' is displayed on the Top Screen.

E10: Defrost sensor is disconnected

When the temperature in defrost sensor is equal or lower than about -50℃, 'E10' is displayed on the Top Screen.

E11: Defrost sensor is short circuited

When the temperature in defrost sensor is equal or higher than about +70℃, 'E11' is displayed on the Top Screen.

5. Alarms

Auto-set temp. alarm

Condition: When the chamber temperature deviates from set temperature

Operation: Current chamber temperature blinks and buzzer sounds intermittently with 15 minutes of delay. Buzzer stops sounding by pressing BUZZER key, but it sounds again after alarm delay time has passed.
When chamber temperature is equal or higher than +20℃ during defrosting, temp. alarm is emitted.

Setting range: +/-1.0 ~ +/-5.0℃, changeable (Initial: +/-2.5℃)

Ring back: 1~99 minutes, changeable (initial: 30 minutes) 0 = No ring back

Alarm delay time: 0~15 minutes, changeable (initial: 15 minutes) 0 = No delay

When alarm set temperature is changed:

Set temp. after changed + auto-set temp. alarm range = Range for upper limit temp. alarm
Set temp. before change – auto-set temp. alarm range = Range for lower limit temp. alarm

Door alarm

Condition: When the door is open for 2 minutes

Operation: Buzzer sounds intermittently and digits at the upper right side on Top Screen blink. When you shut the door or press BUZZER key, the buzzer stops sounding.

Remote alarm

Operation of remote alarm contact:

NC-COM:	Close	NO-COM:	Open	=> For normal condition
NC-COM:	Open	NO-COM:	Close	=> For Auto-set temp. alarm
NC-COM:	Open	NO-COM:	Close	=> For Upper limit/lower limit temp. alarm

6. Compressor ON/OFF control

Compressor ON: When compressor delay timer is '0' and controlled temperature deviates +0.35℃ from set temperature for twice.

Compressor OFF: Set temperature – (compressor delay timer + 1)/30

7. Defrosting in main evaporator

- Unit should start defrosting with main evaporator everyday in specified time and date.
- You can start defrosting manually when you select 'M. Def' in Top Screen.
- Compressor turns off and heater is fully output during defrost.
- When temperature in defrost sensor is over than 8.0℃, defrost comes to end automatically and unit reverts to programmed or fixed operation.
- Programmed time elapses during defrost.
- When temperature in temp. sensor is equal or higher than 20℃, unit stops defrosting with E03 emitted.
- Unit stops defrosting automatically when it keeps defrosting for 30 minutes or more.

8. MENU Auto-off

- In 'MENU' is displayed on Top Screen, it will be disappeared automatically if there are not any key operations for 1 minute.
- In 'MENU' is not displayed on Top Screen, the screen will be renewal once per hour if there are not any key operations.

9. Light control

Settable brightness: 0LS ~ 1LS

Display range: 0LS ~ 1LS

How to set: Press MENU key and step into setting mode. Set by shift key and character input key

Light step 1: Fluorescent lamp is lit
Light step 0: Fluorescent lamp goes off

10. Diagnosis of sensor error

When unit detects input voltage which is more than upper limit temperature or less than lower limit temperature for 5 times, it diagnoses as follow;

Item	Input voltage	Condition
Chamber temp.	4900mV or more (corresponds to -50.0℃)	Sensor is open circuited
	900mV or less (corresponds to 70.0℃)	Sensor is short circuited
Main evaporator defrosting	4900mV or more (corresponds to -50.0℃)	Sensor is open circuited
	900mV or less (corresponds to 70.0℃)	Sensor is short circuited
Compressor protection	4900mV or more (corresponds to -50.0℃)	Sensor is open circuited
	900mV or less (corresponds to 70.0℃)	Sensor is short circuited

Operational specifications of LCD panel

Note) Here are introduced the service tools for service representative's use.
Common functions are refererd to the Instruction's Manual following.

Contents

1. Temperature caliblation, analog output, special mode

2. Version check

3. Temperature Zero calibration

4. Temperature Span calibration

5. Analog output calibration

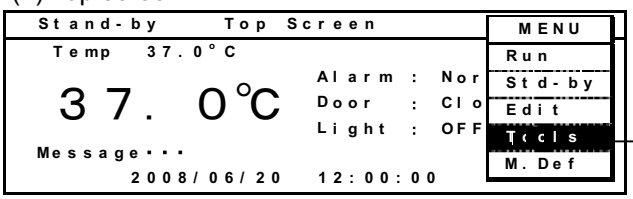
6. Data delete, data initialization

7. Test programming run

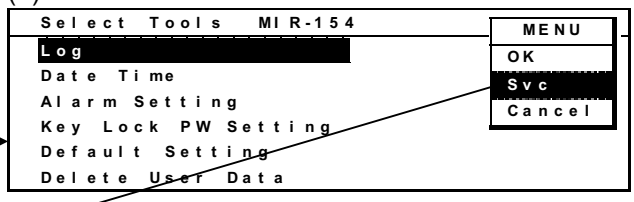
1. MENU/Tools – Select Tools Svc for service

Temperature calibration, analog output, special mode

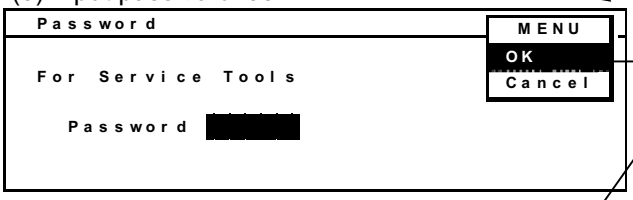
(1) Top screen



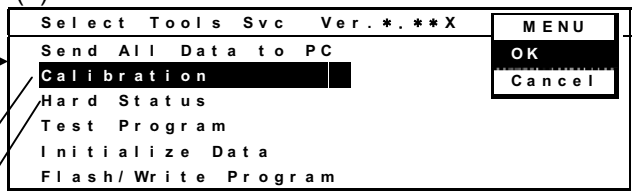
(2)



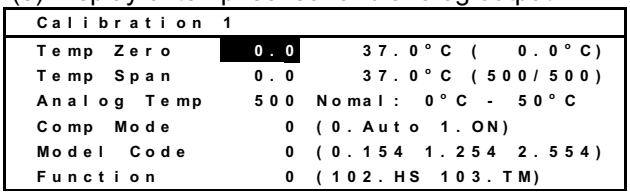
(3) Input password '384'



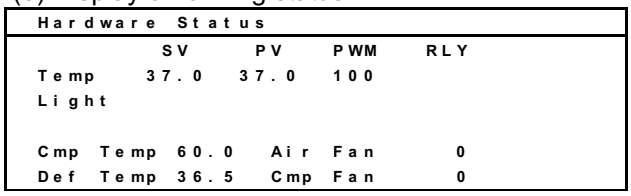
(4)



(5) Display of temp. sensor and analog output


Calibration 1
Temp Zero 0.0 37.0°C (0.0°C)
Temp Span 0.0 37.0°C (500/500)
Analog Temp 500 Nomal: 0°C - 50°C
Comp Mode 0 (0.Auto 1.ON)
Model Code 0 (0.154 1.254 2.554)
Function 0 (102.HS 103.TM)

(6) Display of running status



Service rep. can check status following;
Chamber temp., sensor temp., heater output,
comp. protection temp., defrost temp.,
circulating fan accumulation time,
comp. cooling fan accumulating time

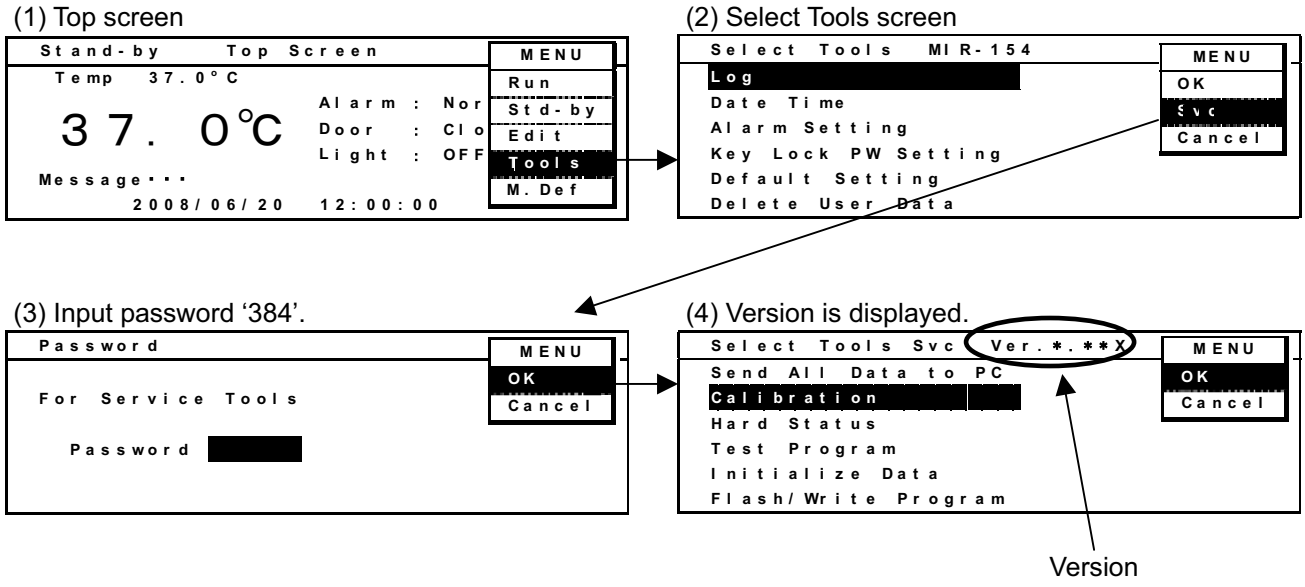
Function No.	Function
0	Factory outgoing mode
101	Unused
102	Display of current chamber temperatures and set temperature.
103	Shorten timer for programming run Hour→Minute, Minute→Second
104	Output for log data address
105	Unused
111	Check for password of Key Lock. Password is displayed on upper area of LCD.
222	Reset of circulating fan accumulation time
333	Reset of Comp. cooling fan accumulation time
925	Non-volatile memory initialization After you set function number to '925', perform MENU/Tools - Svc – Initialize Data and power off and on. Non-volatile memory is initialized. Function number is changed to '0' automatically after initialization done. (Note) Temperature calibration value is also initialized.

(Note) Function number should be '0' in testing process or factory outgoing.

2. MENU/Tools – Select Tools Svc for service

Version check

Process	Operation	MENU
0	Turn the power on.	
1	Top Screen	Tools
2	Select Tools screen	Svc
3	Input password ‘384’	OK
4	Version is displayed on the upper right side.	

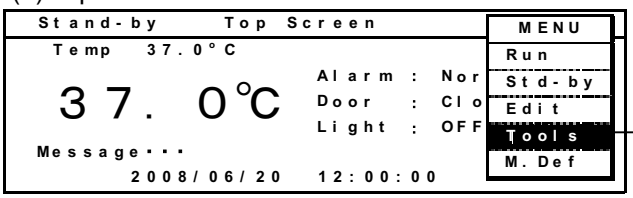


3. MENU/Tools – Select Tools Svc for service
Temperature Zero calibration

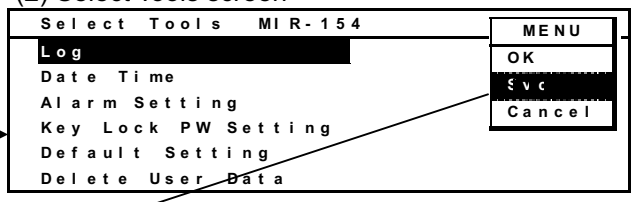
Process	Operation (Ex. Set temperature is 25℃)	MENU
0	Set temp. sensor for calibration at the center of chamber. Set Light Step to 'LS0'. Set chamber temperature in 25℃ and leave the unit running until temperature stable.	
1	Top screen	Tools
2	Select Tools screen	Svc
3	Input '384' for password.	OK
4	Set to 'Calibration ' in the Select Tools screen.	OK
5	Enter the value in temp. sensor (Ex. 26.5℃) to Temp. Zero line. ※ Input range: ±2.0℃ from value in temp. sensor	OK
6	Return to Select Tools screen.	

※ (Ex.) When chamber temp. is 25.0℃ and the value in temp. sensor is 28.0℃;
Input '26.5℃' firsit in Temp Zero line.
Then input 28.0℃ after the chamber temperature is stable.

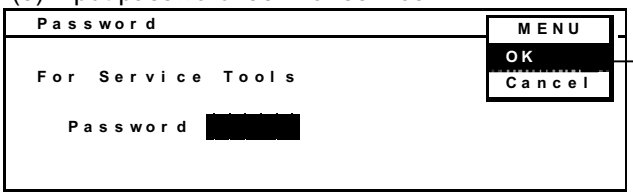
(1) Top Screen



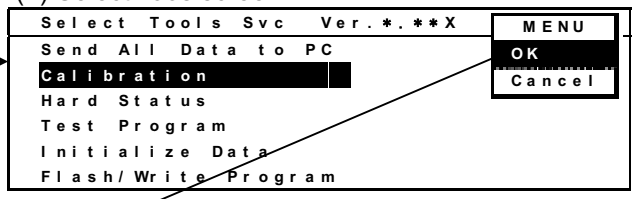
(2) Select Tools screen



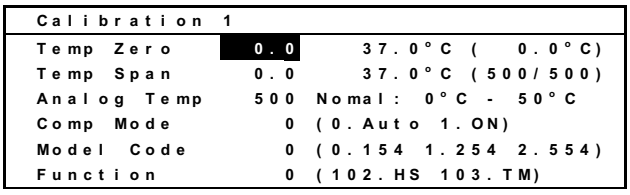
(3) Input password '384' for service



(4) Select Toos screen



(5) Current calibration value is displayed.


Calibration 1
Temp Zero 0.0 37.0°C (0.0°C)
Temp Span 0.0 37.0°C (500/500)
Analog Temp 500 Nomal: 0°C - 50°C
Comp Mode 0 (0.Auto 1.ON)
Model Code 0 (0.154 1.254 2.554)
Function 0 (102.HS 103.TM)

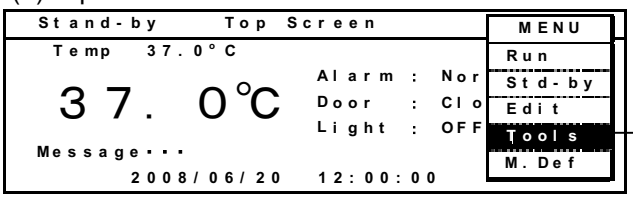
Temperature which is obtained by sensor+calibration value
= Controlled temperature

4. MENU/Tools – Select Tools Svc for service

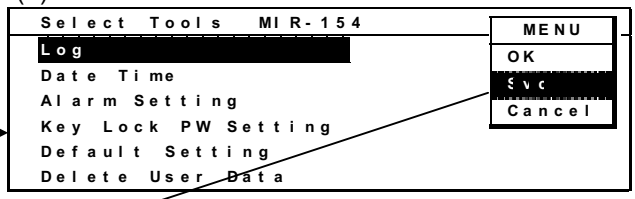
Temperature span calibration

Process	Operation (Ex. Set temperature is 45℃)	MENU
0	Set temp. sensor for calibration at the center of chamber. Set Light Step to 'LS0'. Set chamber temperature to 45℃ (40℃~50℃, desireable) and leave the unit running until stable.	
1	Top screen	Tools
2	Select Tools screen	Svc
3	Input password '384' for service.	OK
4	Select 'Calibration" in Select Tools screen.	OK
5	Input displayed value in temp. sensor (Ex. 46.5℃) in Temp Span line.	OK
6	Return to Select Tools screen.	

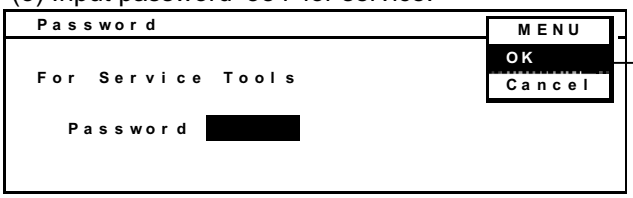
(1) Top screen



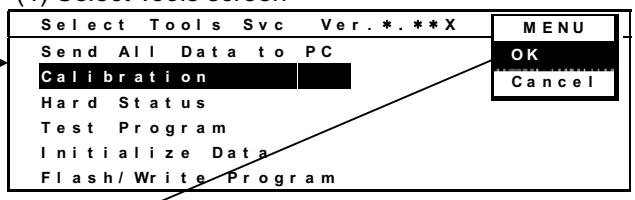
(2) Select Tools screen



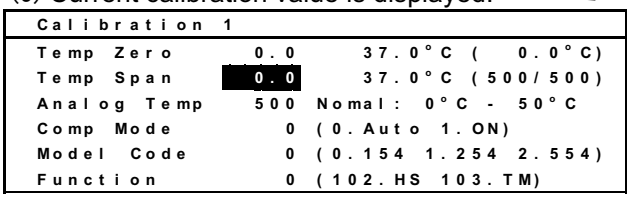
(3) Input password '384' for service.



(4) Select Tools screen



⑸ Current calibration value is displayed.


Calibration 1
Temp Zero 0.0 37.0°C (0.0°C)
Temp Span 0.0 37.0°C (500/500)
Analog Temp 500 Nomal: 0°C - 50°C
Comp Mode 0 (0.Auto 1.ON)
Model Code 0 (0.154 1.254 2.554)
Function 0 (102.HS 103.TM)

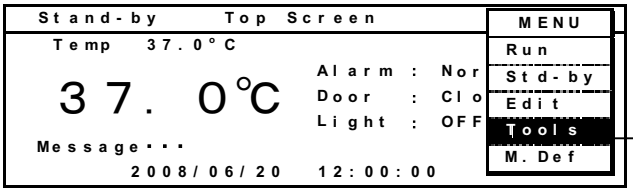
Temperature which is obtained by sensor X (calibration value/500) = Controlled temperature

5. MENU/Tools – Select Tools Svc for service

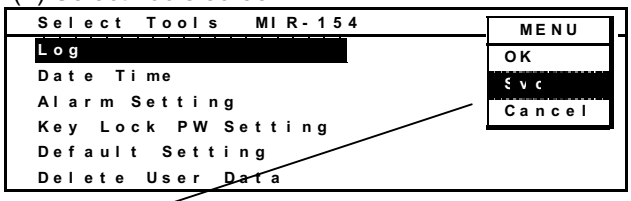
Analog output calibration

Process	Operation (Ex. Chamer temp. is set in 37℃)	MENU
0	Set Light Step to 'LS0' and set chamber temperature to 37℃ and leave the unit running until stable.	
1	Top Screen	Tools
2	Select Tools screen	Svc
3	Input password '384' for service.	OK
4	Select 'Calibration' in Select Tools screen.	OK
5	Adding 10 to the Analog Temp line that makes analog output about 2mV higher. The range of analog output is 0~100mV for 0~50℃.(2mv/℃) (Ex.) When chamber temp. is 37℃, analog Temp is 503 and analog output voltage is 72mV, input '513' in Analog Temp line that is caused analog output voltage to about 74mV.	OK
6	Return to Select Tools screen.	

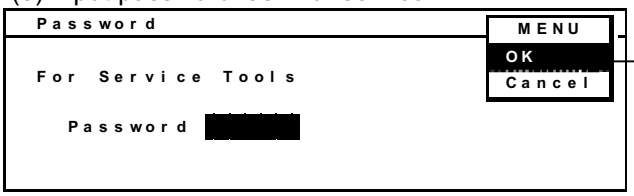
(1) Top screen



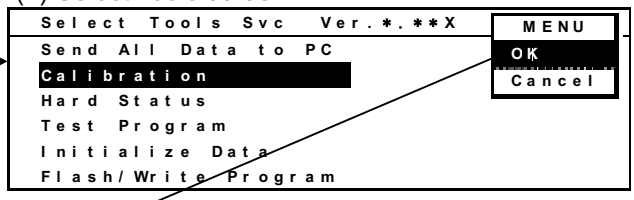
(2) Select Tools screen



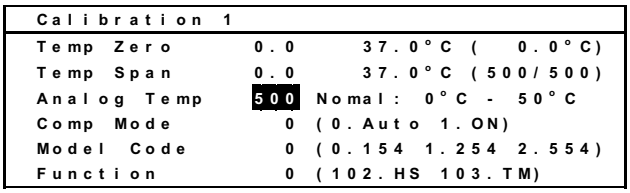
(3) Input password '384' for service.



(4) Select Tools screen



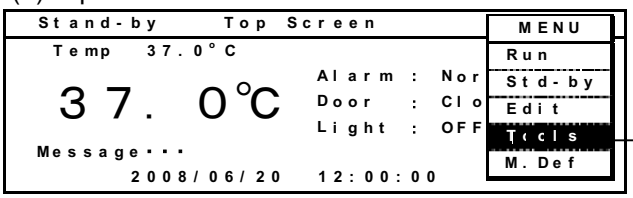
(5) Display of analog temp. calibration


Calibration 1
Temp Zero 0.0 37.0°C (0.0°C)
Temp Span 0.0 37.0°C (500/500)
Analog Temp 500 Nomal: 0°C - 50°C
Comp Mode 0 (0.Auto 1.ON)
Model Code 0 (0.154 1.254 2.554)
Function 0 (102.HS 103.TM)

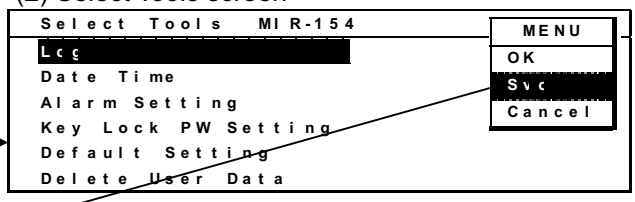
6. MENU/Tools – Select Tools Svc for service

Data delete and initialization

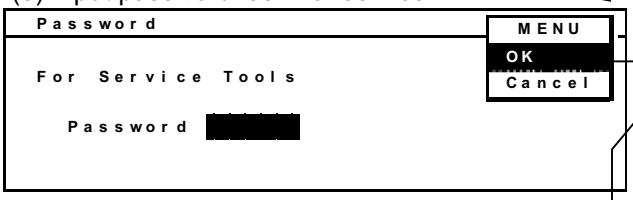
(1) Top screen



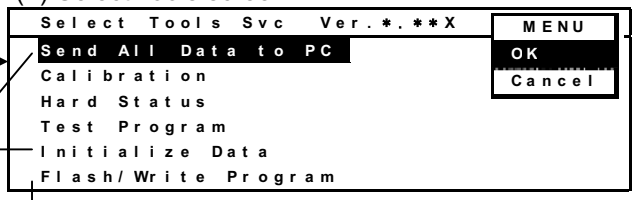
(2) Select Tools screen



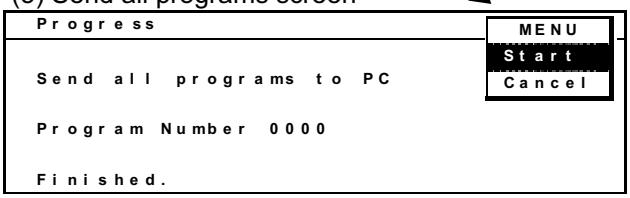
(3) Input password '384' for service



(4) Select Tools screen

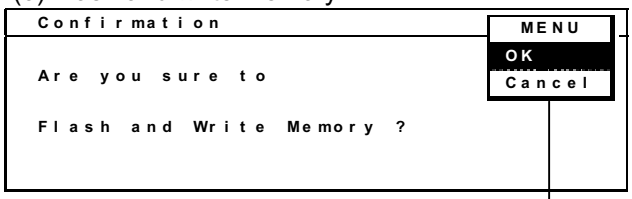


(5) Send all programs screen



Resistered all common users and programs will be sent.
After the sending is done, 'Finished' will be displayed.

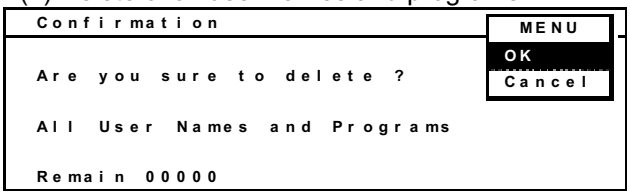
(6) Flash and write memory



(8) Programming

Reboot after programming is done.

(7) Delete of all user names and programs



Refer to <Note> in the following page.

<Note>
1. 'Initialize Data' means that all user's programs are deleted, but calibration data are not deleted.

2. Procedure to initialize calibration data and user's programs
   ① Set '925' in the Function of Calibration 1.
   ② Delete all the user's data by Initialize Data MENU/OK.
   ③ Turn the power off and on.

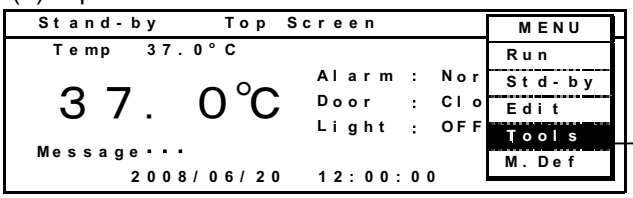
Item	Initial data
Stand-by temp.	:25℃
Lighting	:0(OFF)
Span calibration	:500(center of the range, 0~999)
Zero calibration	:500(center of the range, 0~999)
Auto defrost	:0(No)
Time to start Auto defrost	:3:00a.m. (Not displayed on LCD)
Analog output range	:478(Wide:460)
Log collection interval	:6 minutes
Model	:0(MIR-154)
Communication speed(DAQ)	:0(2400bps)
Communication ID(DAQ)	:0
Temp. alarm	:±2.5℃
Alarm delay	:15 minutes
Ring bakc	:30 minutes
Additional lighting	:0(None)
Key lock password	:0000

3. Re-programming of flash memory
   Optional MTR-480 is used in RS232C mode with cable RS232C and writable software.

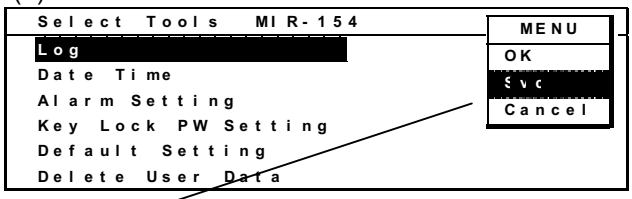
7. MENU/Tools – Select Tools Svc for service
Test programming run

Process	Operation	MENU
1	Top Screen	Tools
2	Select Tools screen	Svc
3	Input password ‘384’ for service.	OK
4	Select ‘Test Program’ on Select Tools screen.	OK
5	Start programming run.	Start
6	Return to Top Screen after programming run completed.	

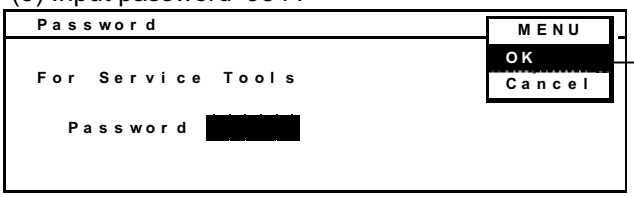
(1) Top Screen



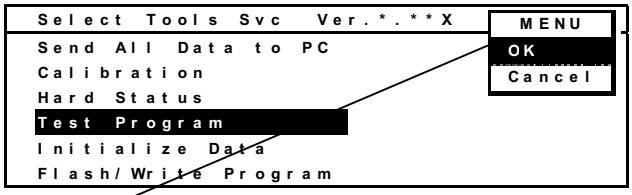
(2) Select Tools screen



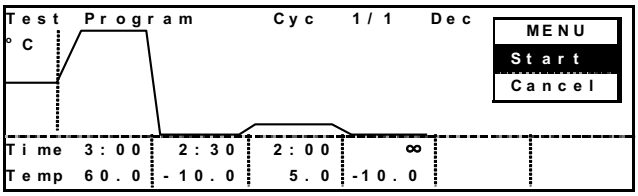
(3) Input password ‘384’.



(4) Select Tools screen



(5) Start to programming run



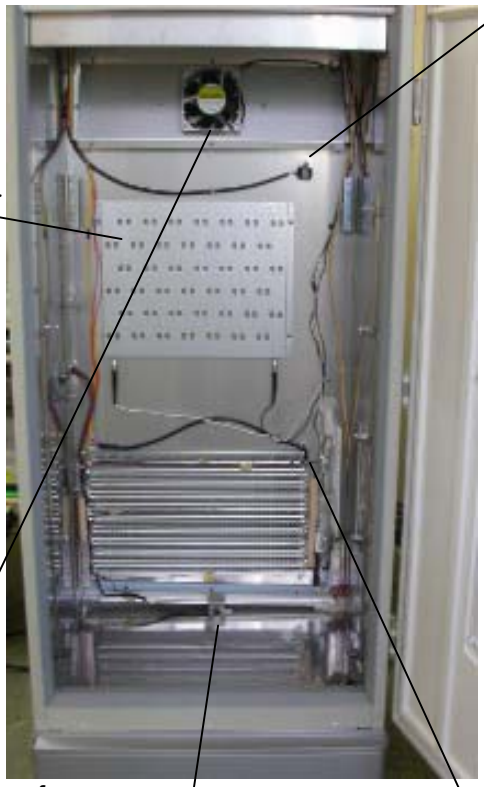
Parts layout

【MIR-154】

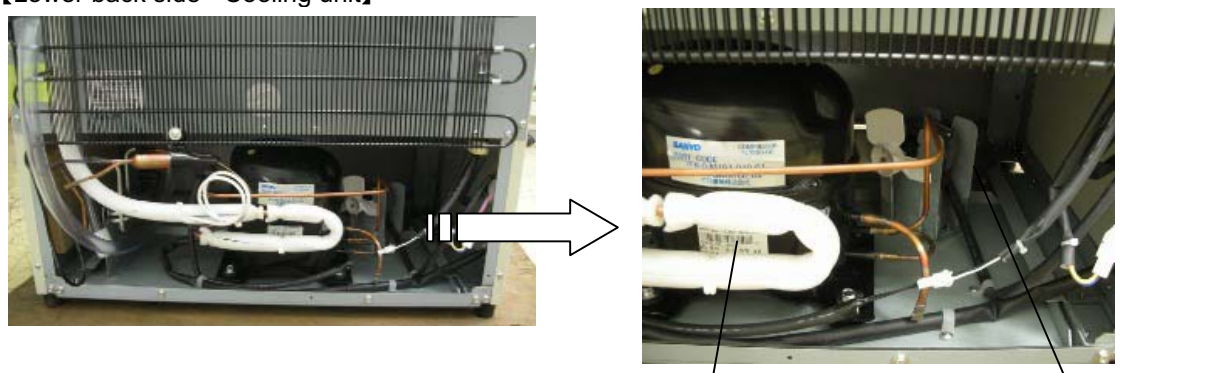
【MIR-154 Mullion removed】

【MIR-254】

【MIR-254 Mullion removed】



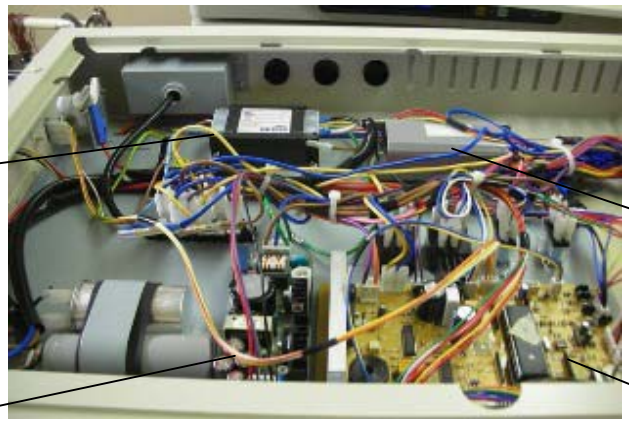
【Lower back side - Cooling unit】



【Upper left side】

【MIR-154/Electric BOX】

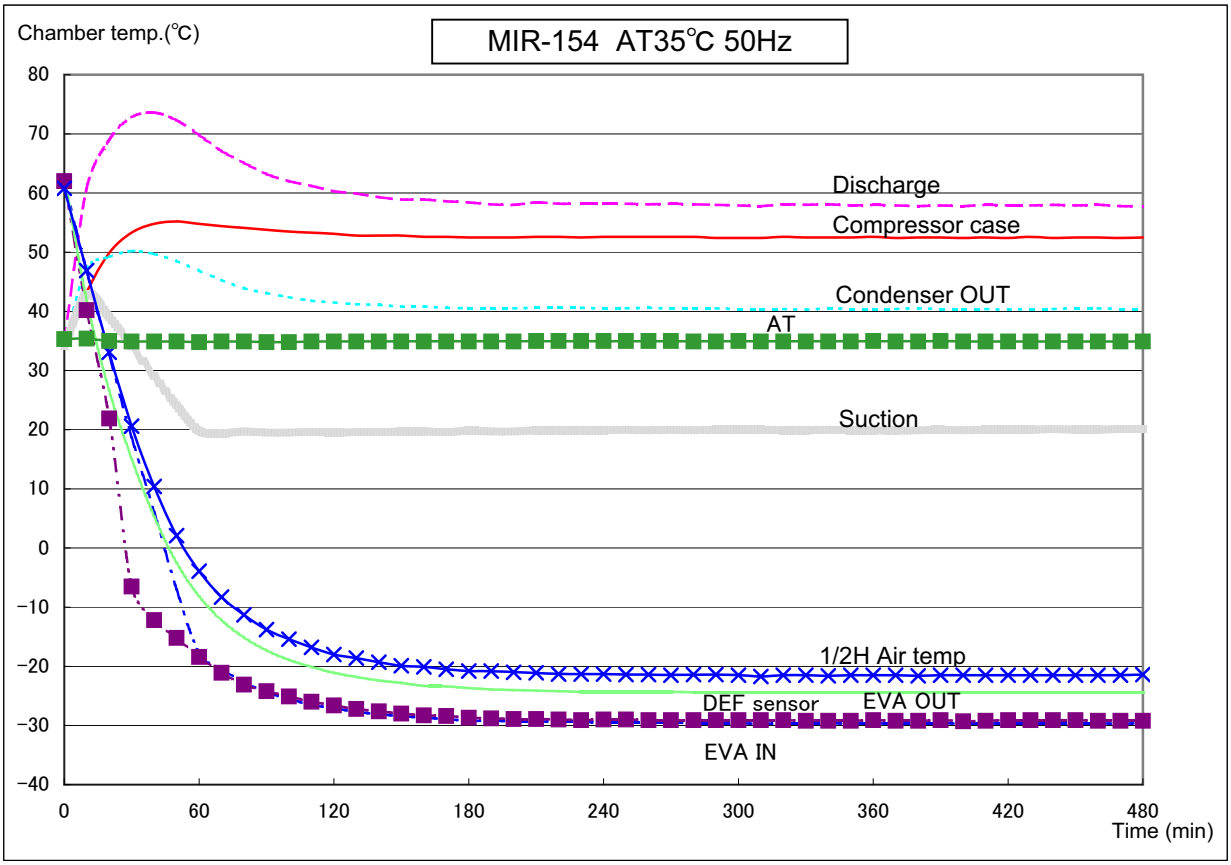
【MIR-254/Electric BOX】



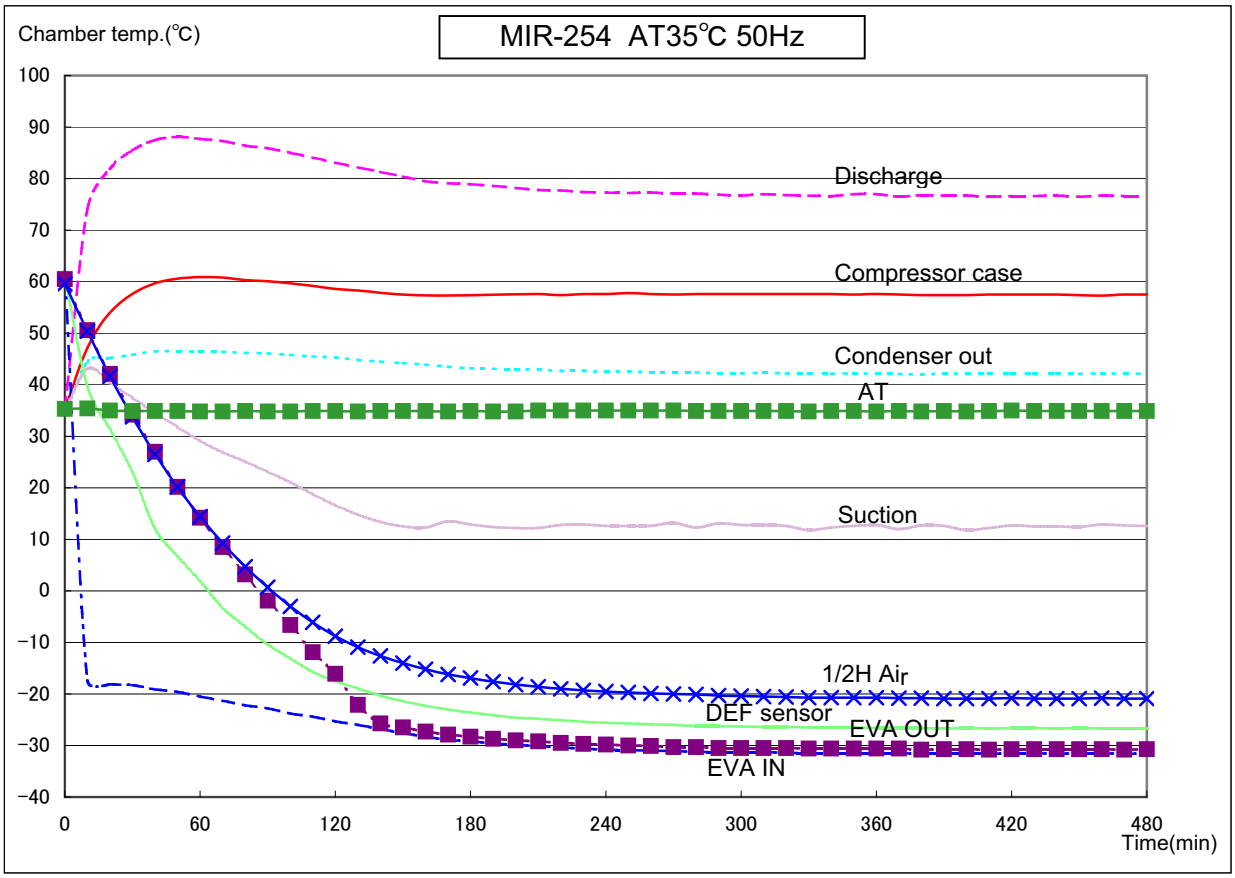
Test data

※All the data are the reference only.

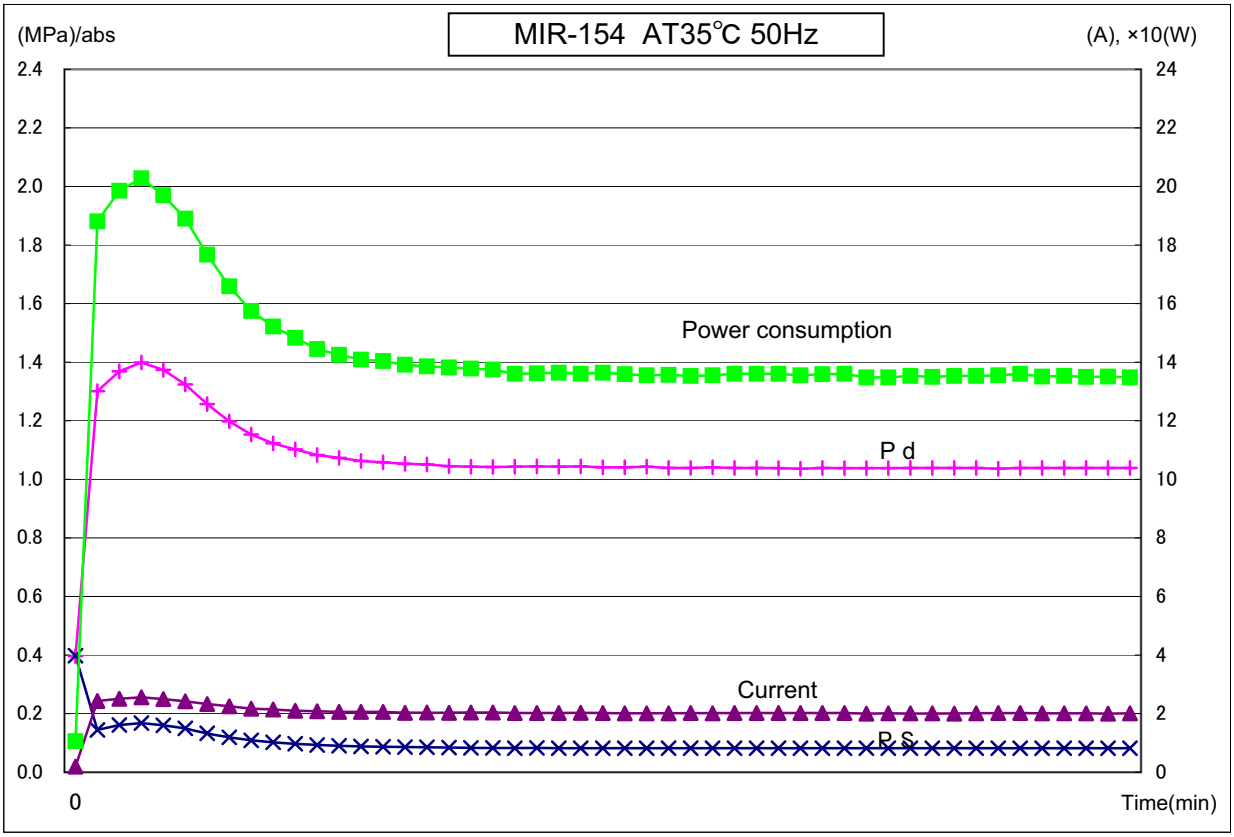
MIR-154 Pull-down data



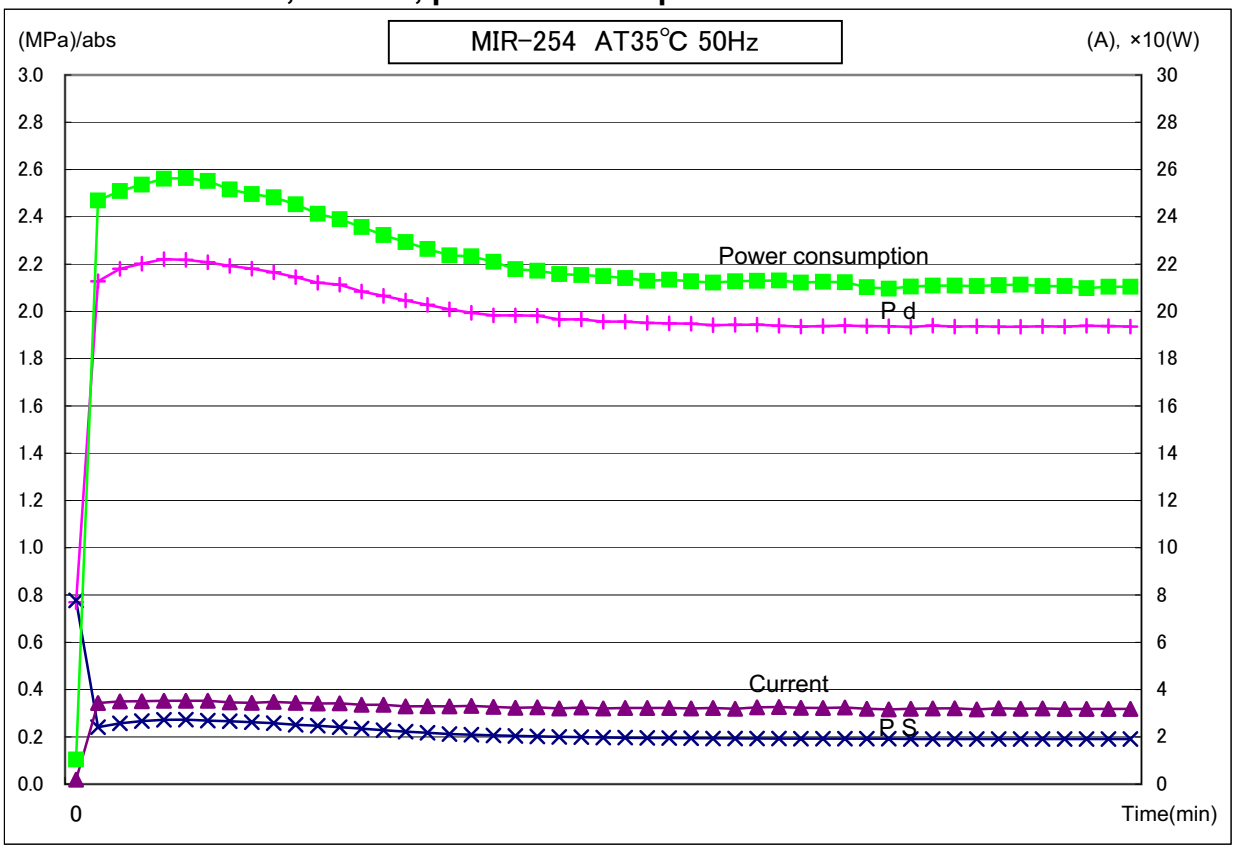
MIR-254 Pull-down data



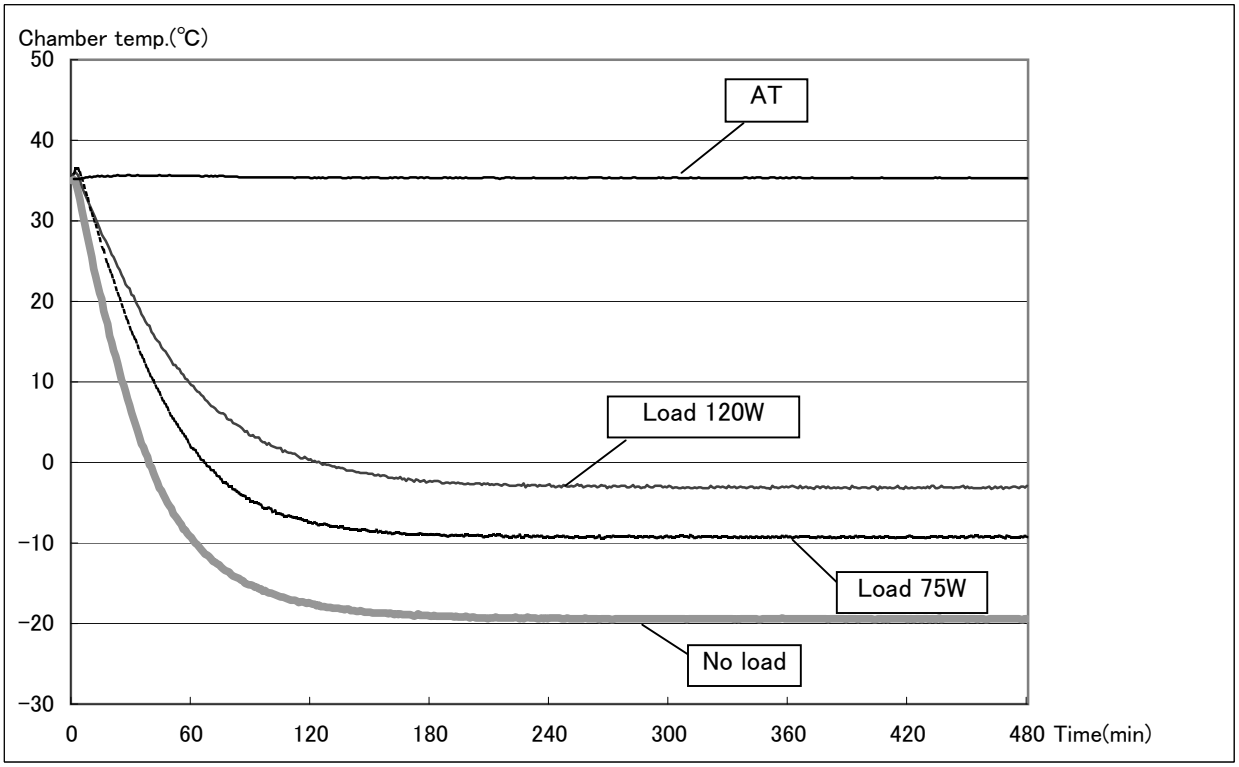
MIR-154 Pressure, current, power consumption



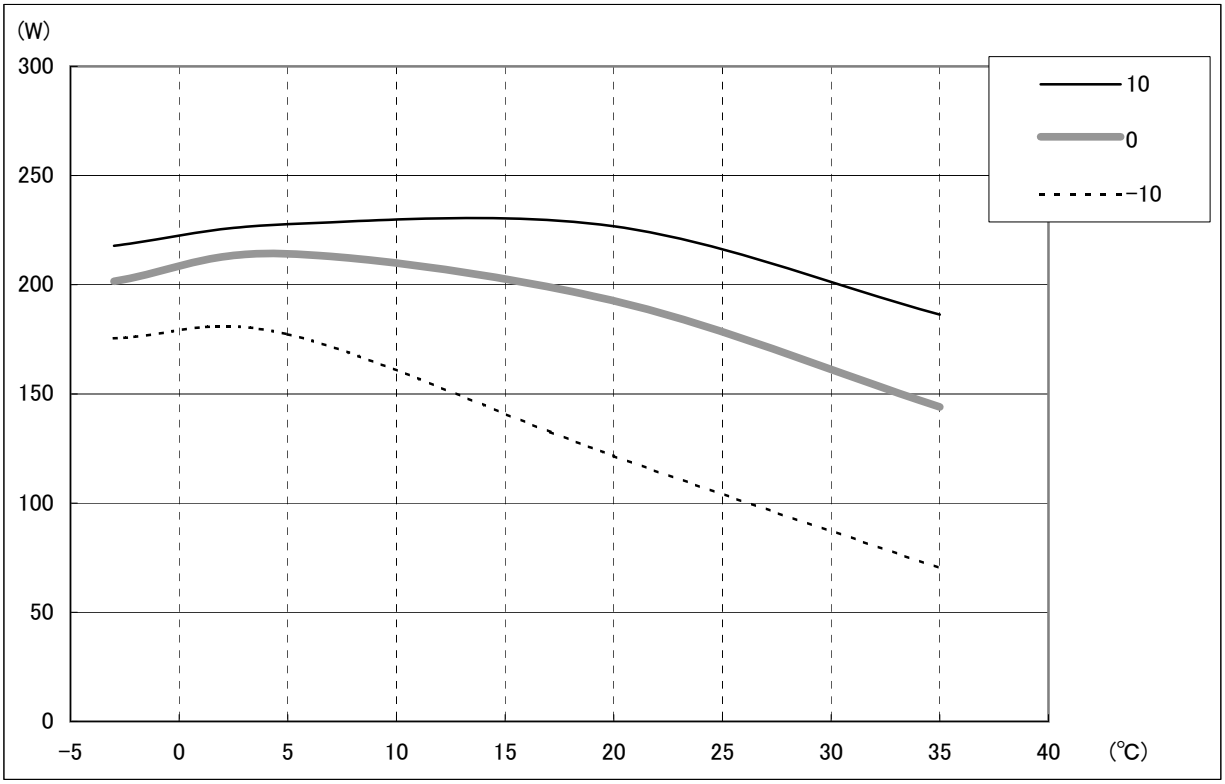
MIR-254 Pressure, current, power consumption



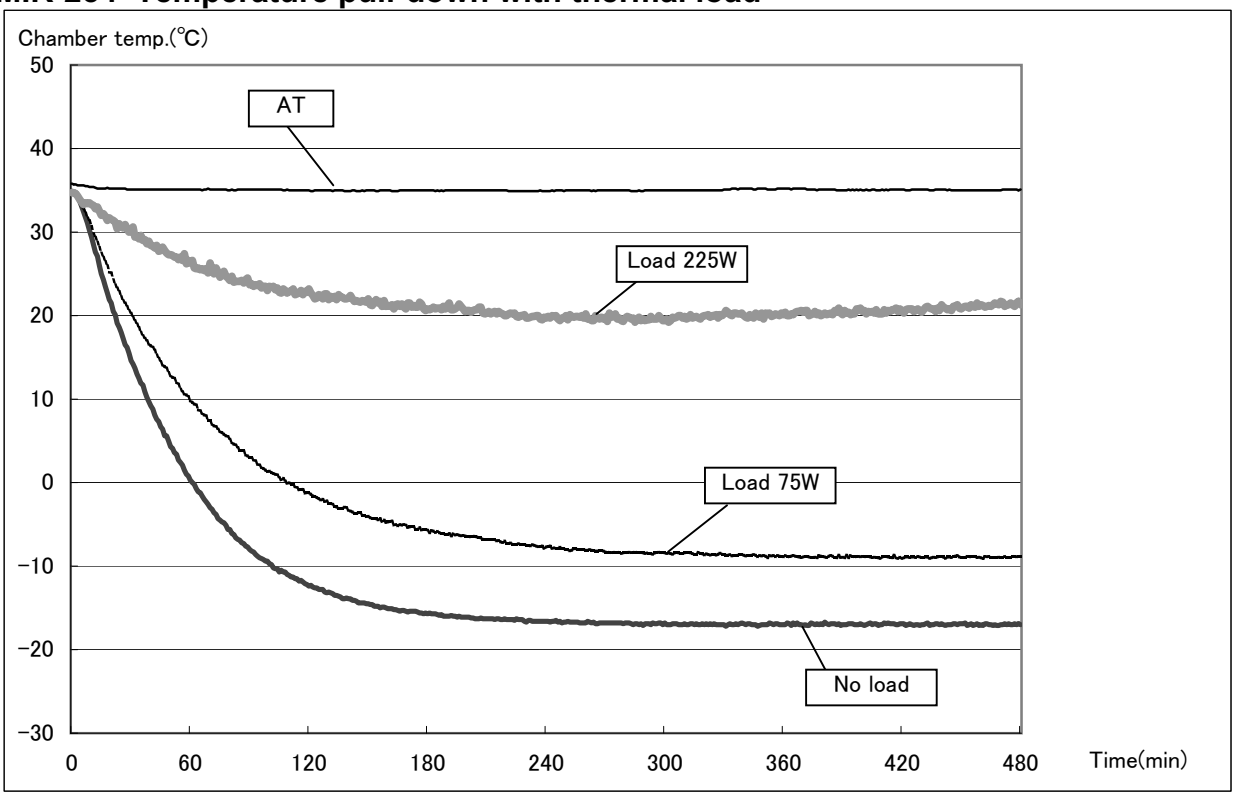
MIR-154 Temperature pull-down with thermal load



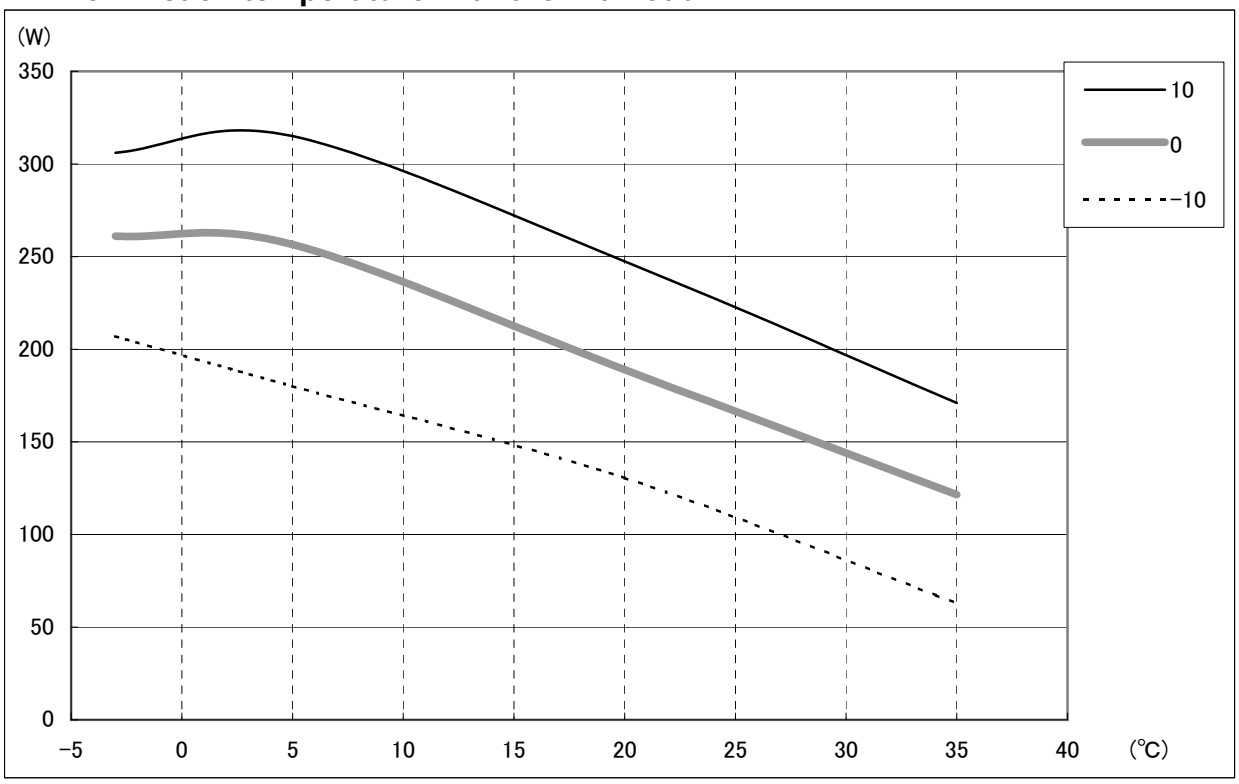
MIR-154 Reach temperature with thermal load



MIR-254 Temperature pull-down with thermal load



MIR-254 Reach temperature with thermal load



*** Amount of power consumption**

MIR-154

AT	SV	110V60Hz	115V60Hz	220V50Hz	230V50Hz	240V50Hz	220V60Hz
20℃	5℃	2.033	1.933	1.996	1.993	2.129	1.740
	22℃	0.377	0.272	0.346	0.285	0.294	0.336
	37℃	0.774	0.779	0.822	0.818	0.829	0.870
30℃	5℃	2.414	2.568	2.334	2.468	2.577	2.231
	22℃	0.881	0.942	0.818	0.919	1.008	1.056
	37℃	0.426	0.403	0.454	0.451	0.442	0.529

(kWh/day)

MIR-254

AT	SV	110V60Hz	115V60Hz	220V50Hz	230V50Hz	240V50Hz	220V60Hz
20℃	5℃	2.388	2.363	2.218	2.301	2.319	2.111
	22℃	0.298	0.318	0.270	0.258	0.286	0.263
	37℃	1.177	1.184	1.115	1.123	1.101	1.100
30℃	5℃	2.955	3.008	2.711	2.769	2.928	2.840
	22℃	1.435	1.511	1.283	1.297	1.394	1.452
	37℃	0.612	0.597	0.640	0.557	0.506	0.556

(kWh/day)

*** Noise level**

Condition: AT30℃, no load, 1m(W) x 1m(H)

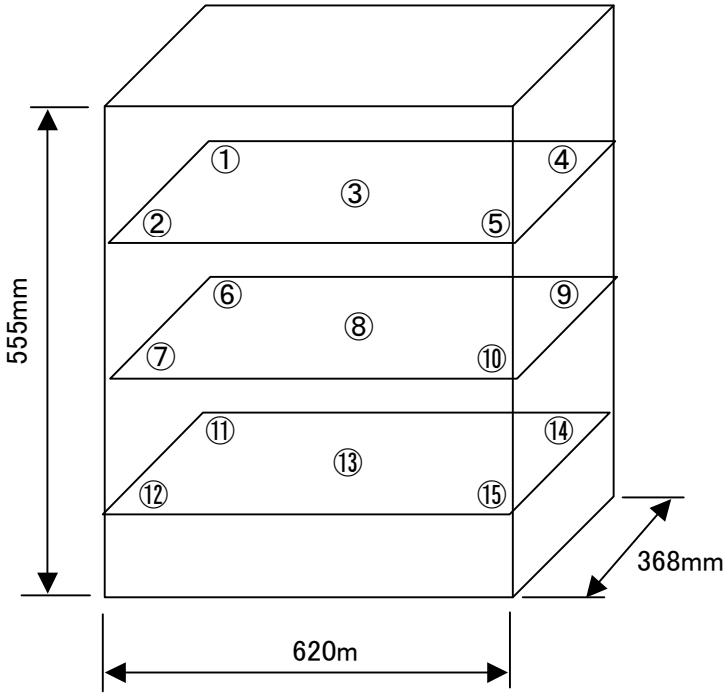
MIR-154: 41 dB (A scale)
MIR-254: 44 dB (A scale)

MIR-154 Temperature uniformity (15points measured)

* Data are the reference only.

<Condition>

AT: 20, 30℃
Power source: 1φ, 50/60Hz
No load



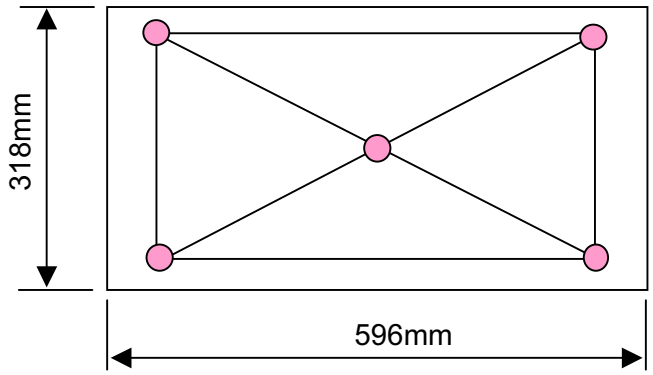
<Measured points>

①②④⑤⑪⑫⑭⑮
W: 90% of fully width of shelf
D: 90% of fully depth of shelf
H: 5% of inner height

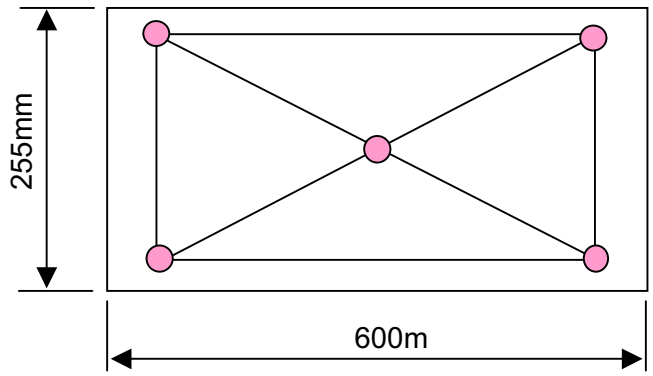
⑥⑦⑨⑩
W: 90% of fully width of shelf
D: 90% of fully depth of shelf
H: 1/2 height

③⑧⑬
W/D/H: Middle point of each shelf

Dimensions of upper and middle shelves



Dimensions of lower shelf



MIR-154

・Temperatures accuracy, range, variation

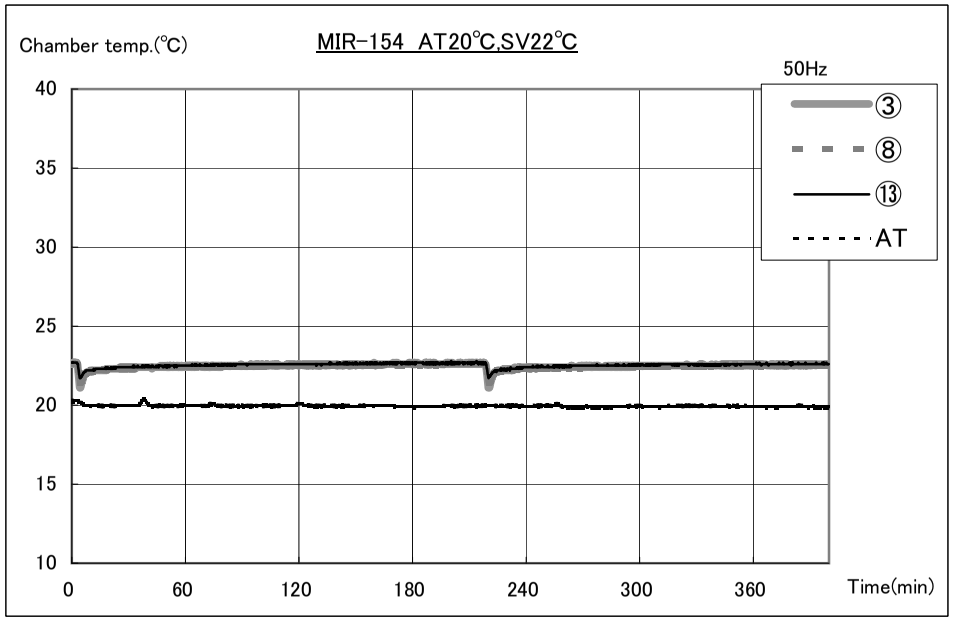
SV	22℃				37℃			
AT	20℃		30℃		20℃		30℃	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Accuracy	+0.1℃ (22.1℃)	-0.1℃ (21.9℃)	±0℃ (22.0℃)	-0.1℃ (21.9℃)	+0.5℃ (37.5℃)	+0.5℃ (37.5℃)	+0.4℃ (37.4℃)	+0.4℃ (37.4℃)
Range	±0.7℃ (21.4～22.7℃)	±0.9℃ (21.0～22.7℃)	±0.8℃ (21.2～22.7℃)	±0.8℃ (21.1～22.7℃)	±0.1℃ (37.5～37.6℃)	±0.1℃ (37.5～37.6℃)	±0.1℃ (37.3～37.5℃)	±0.1℃ (37.3～37.4℃)
Variation	±0.3℃ (21.7～22.2℃)	±0.3℃ (21.5～22.1℃)	±0.5℃ (21.6～22.6℃)	±0.6℃ (21.5～22.6℃)	±1.0℃ (36.0～37.9℃)	±1.0℃ (36.0～37.9℃)	±0.5℃ (36.7～37.6℃)	±0.5℃ (36.7～37.6℃)

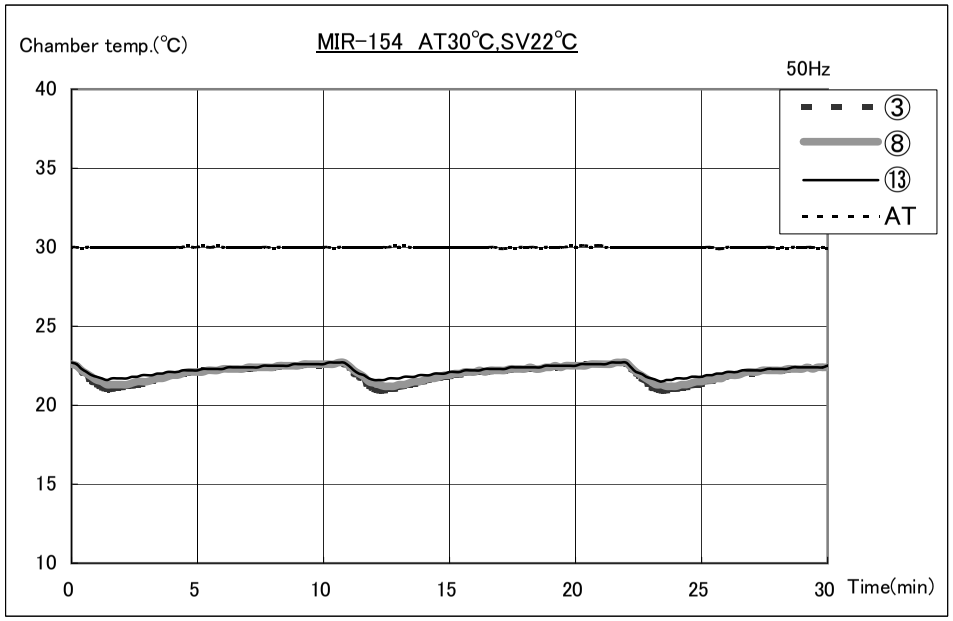
・SV22℃

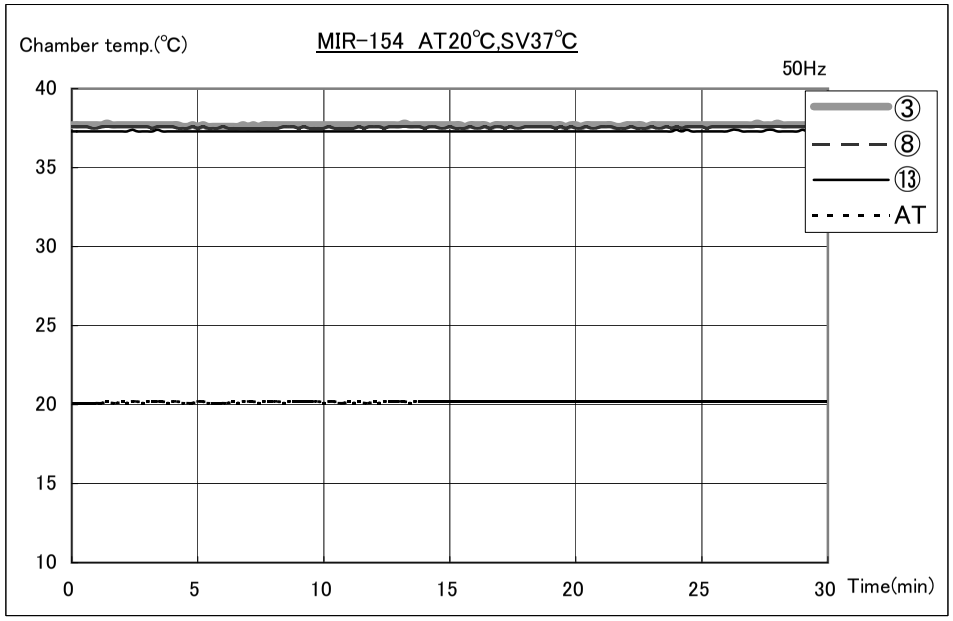
SV	22℃															
AT	20℃								30℃							
	50Hz				60Hz				50Hz				60Hz			
	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Ramge (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)
①	21.7	22.8	20.6	±1.1	21.5	22.7	20.2	±1.3	21.6	22.7	20.4	±1.2	21.5	22.7	20.3	±1.2
②	22.0	22.6	21.3	±0.7	21.9	22.6	21.1	±0.8	22.4	23.1	21.6	±0.8	22.3	23.1	21.5	±0.8
③	21.9	22.7	21.1	±0.8	21.8	22.7	20.8	±0.9	21.8	22.7	20.9	±0.9	21.8	22.7	20.8	±0.9
④	21.8	22.8	20.8	±1.0	21.5	22.7	20.3	±1.2	21.6	22.8	20.4	±1.2	21.5	22.7	20.3	±1.2
⑤	21.8	22.8	20.8	±1.0	21.5	22.7	20.4	±1.2	21.6	22.7	20.5	±1.1	21.5	22.7	20.4	±1.2
⑥	22.2	22.6	21.8	±0.4	22.1	22.6	21.7	±0.4	22.2	22.6	21.8	±0.4	22.1	22.6	21.7	±0.4
⑦	22.0	22.7	21.3	±0.7	21.8	22.7	21.0	±0.9	21.9	22.7	21.2	±0.8	21.9	22.7	21.1	±0.8
⑧	22.1	22.7	21.4	±0.7	21.9	22.7	21.0	±0.9	22.0	22.7	21.2	±0.8	21.9	22.7	21.1	±0.8
⑨	22.0	22.7	21.3	±0.7	21.9	22.7	21.0	±0.9	21.8	22.6	21.0	±0.8	21.8	22.7	20.9	±0.9
⑩	21.9	22.7	21.1	±0.8	21.8	22.7	20.8	±1.0	21.7	22.6	20.7	±0.9	21.7	22.7	20.6	±1.1
⑪	22.1	22.6	21.6	±0.5	22.0	22.6	21.4	±0.6	22.4	22.9	21.9	±0.5	22.3	22.9	21.7	±0.6
⑫	22.0	22.4	21.5	±0.4	21.9	22.4	21.3	±0.6	22.6	23.1	22.1	±0.5	22.6	23.2	22.0	±0.6
⑬	22.2	22.7	21.6	±0.6	22.1	22.8	21.4	±0.7	22.0	22.6	21.4	±0.6	22.1	22.7	21.4	±0.7
⑭	22.1	22.7	21.6	±0.5	22.0	22.8	21.3	±0.8	22.1	22.7	21.5	±0.6	22.1	22.8	21.4	±0.7
⑮	22.1	22.6	21.6	±0.5	22.0	22.7	21.3	±0.7	22.5	23.1	22.0	±0.6	22.5	23.2	21.9	±0.7

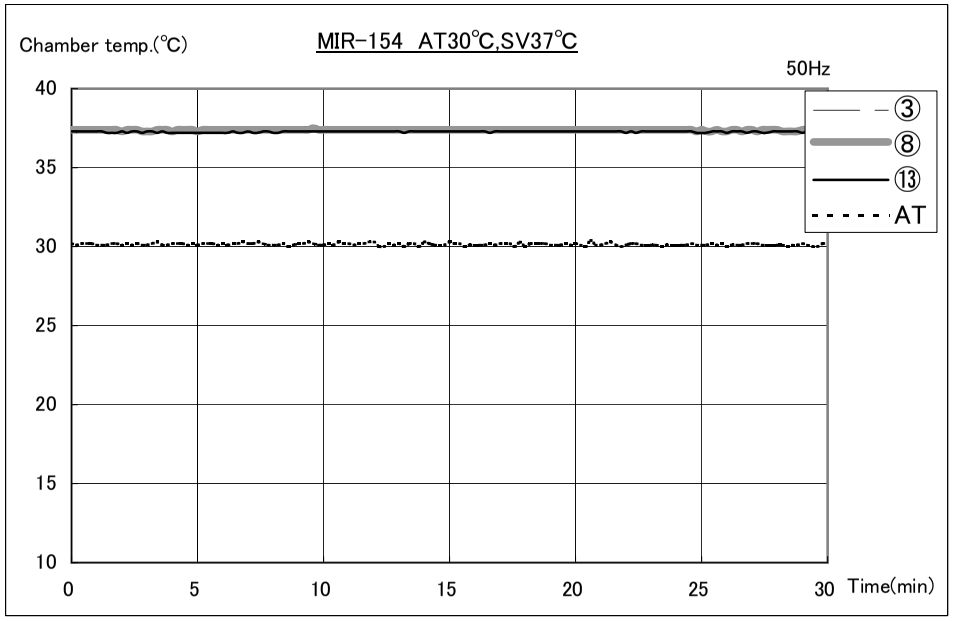
・SV37℃

SV	37℃															
AT	20℃								30℃							
	50Hz				60Hz				50Hz				60Hz			
	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Ramge (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)
①	37.8	37.9	37.8	±0.1	37.9	38.0	37.8	±0.1	37.6	37.6	37.5	±0.1	37.5	37.6	37.4	±0.1
②	36.9	37.1	36.8	±0.2	36.9	37.1	36.8	±0.2	37.2	37.2	37.1	±0.1	37.2	37.2	37.1	±0.1
③	37.7	37.8	37.6	±0.1	37.7	37.8	37.7	±0.0	37.5	37.6	37.4	±0.1	37.5	37.5	37.4	±0.1
④	37.7	37.7	37.6	±0.0	37.7	37.8	37.6	±0.1	37.6	37.7	37.5	±0.1	37.6	37.7	37.5	±0.1
⑤	37.7	37.7	37.6	±0.0	37.7	37.8	37.6	±0.1	37.5	37.6	37.5	±0.1	37.5	37.6	37.5	±0.1
⑥	37.0	37.1	36.9	±0.1	37.1	37.1	37.0	±0.1	37.2	37.3	37.1	±0.1	37.2	37.3	37.2	±0.1
⑦	37.3	37.4	37.2	±0.1	37.4	37.4	37.3	±0.1	37.4	37.5	37.3	±0.1	37.4	37.5	37.3	±0.1
⑧	37.5	37.6	37.5	±0.1	37.5	37.6	37.5	±0.1	37.4	37.5	37.3	±0.1	37.4	37.4	37.3	±0.1
⑨	37.9	38.0	37.9	±0.1	37.9	38.0	37.8	±0.1	37.5	37.6	37.4	±0.1	37.5	37.6	37.4	±0.1
⑩	37.9	38.0	37.9	±0.1	37.9	38.0	37.9	±0.1	37.5	37.6	37.3	±0.2	37.5	37.6	37.4	±0.1
⑪	36.7	36.8	36.6	±0.1	36.7	36.8	36.6	±0.1	37.1	37.2	37.0	±0.1	37.1	37.2	37.0	±0.1
⑫	36.0	36.1	36.0	±0.1	36.0	36.1	35.9	±0.1	36.7	36.8	36.6	±0.1	36.7	36.8	36.6	±0.1
⑬	37.4	37.5	37.4	±0.1	37.4	37.6	37.3	±0.1	37.2	37.2	37.1	±0.0	37.2	37.3	37.0	±0.1
⑭	37.2	37.3	37.1	±0.1	37.2	37.4	37.0	±0.2	37.2	37.3	37.2	±0.0	37.2	37.4	37.1	±0.1
⑮	36.2	36.3	36.0	±0.1	36.2	36.3	36.0	±0.1	36.7	36.8	36.7	±0.0	36.7	36.9	36.6	±0.1


MIR-154 AT20℃,SV22℃
Chamber temp.(℃)
50Hz
③
⑧
⑬
AT
Time(min)

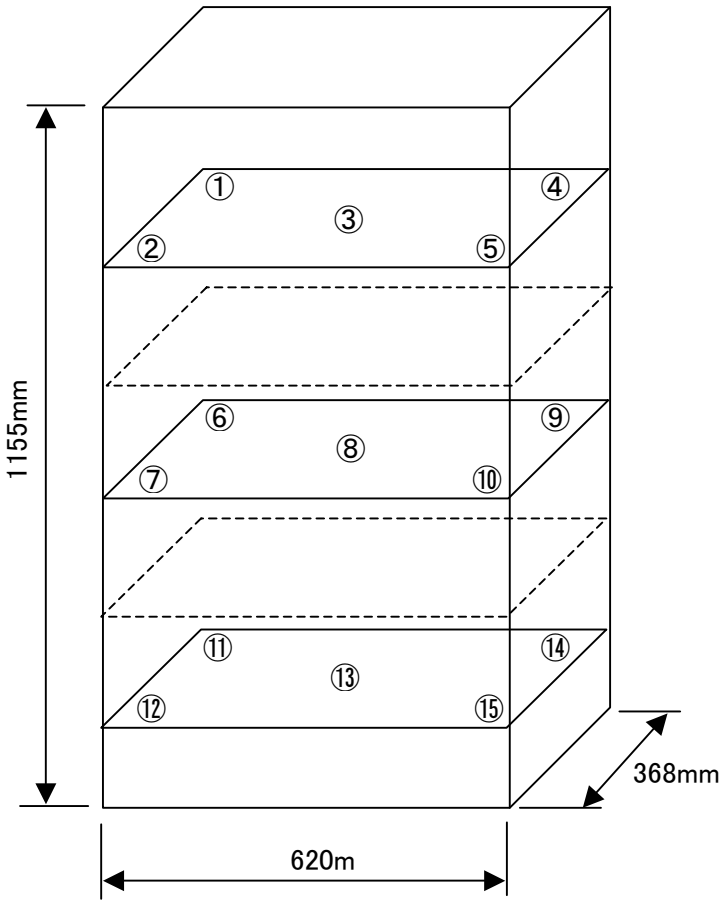

MIR-154 AT30℃,SV22℃
Chamber temp.(℃)
50Hz
③
⑧
⑬
AT
Time(min)


MIR-154 AT20℃,SV37℃
Chamber temp.(℃)
50Hz
③
⑧
⑬
AT
Time(min)


MIR-154 AT30℃,SV37℃
Chamber temp.(℃)
50Hz
③
⑧
⑬
AT
Time(min)

MIR-254 Temperature uniformity (15points measured)

* Data are the reference only.



<Condition>

AT: 20, 30℃
Power source: 1φ, 50/60Hz
No load

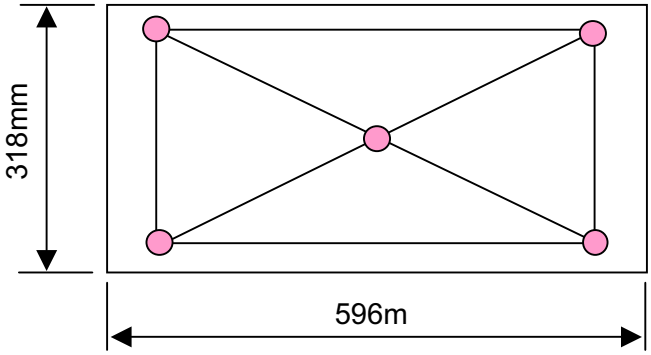
【測定位置】

①②④⑤⑪⑫⑭⑮
W: 90% of fully width of shelf
D: 90% of fully depth of shelf
H: 5% of inner height

⑥⑦⑨⑩
W: 90% of fully width of shelf
D: 90% of fully depth of shelf
H: 1/2 height

③⑧⑬
W/D/H: Middle point of each shelf

Dimensions of shelf



MIR-254

・Temperatures accuracy, range, variation

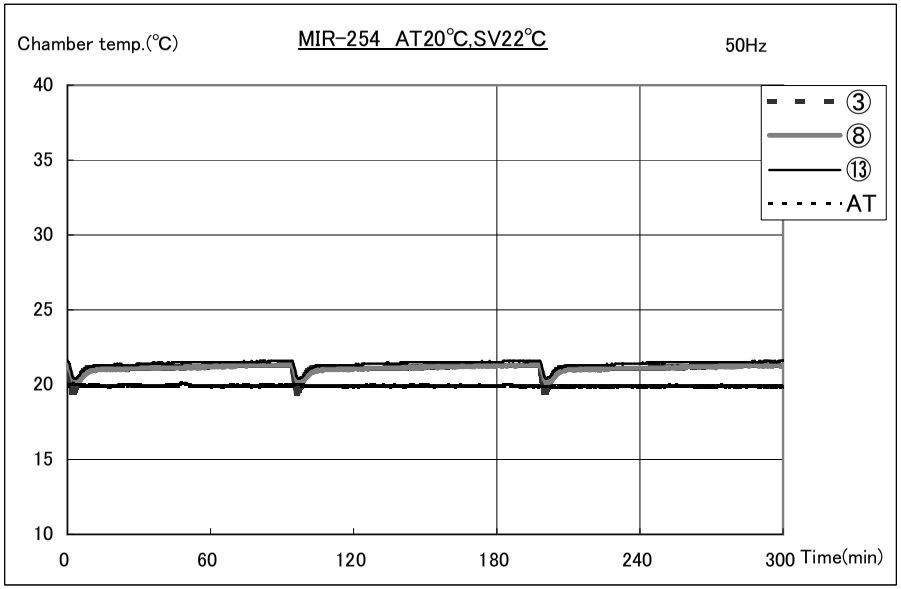
SV	22℃				37℃			
AT	20℃		30℃		20℃		30℃	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
Accuracy	-1.2℃ (20.8℃)	-1.3℃ (20.7℃)	-1.2℃ (20.8℃)	-1.2℃ (20.8℃)	-0.9℃ (36.1℃)	-0.9℃ (36.1℃)	-0.8℃ (36.2℃)	-0.9℃ (36.1℃)
Range	±0.6℃ (20.2～21.4℃)	±0.7℃ (20.0～21.4℃)	±0.6℃ (20.2～21.4℃)	±0.7℃ (20.1～21.4℃)	±0.1℃ (36.0～36.2℃)	±0.1℃ (36.0～36.2℃)	±0.1℃ (36.1～36.2℃)	±0.1℃ (36.0～36.2℃)
Variation	±0.2℃ (22.2～22.5℃)	±0.2℃ (22.2～22.5℃)	±0.4℃ (21.9～22.7℃)	±0.4℃ (21.9～22.7℃)	±0.8℃ (35.5～37.0℃)	±0.8℃ (35.4～36.9℃)	±0.3℃ (35.9～36.4℃)	±0.2℃ (35.9～36.3℃)

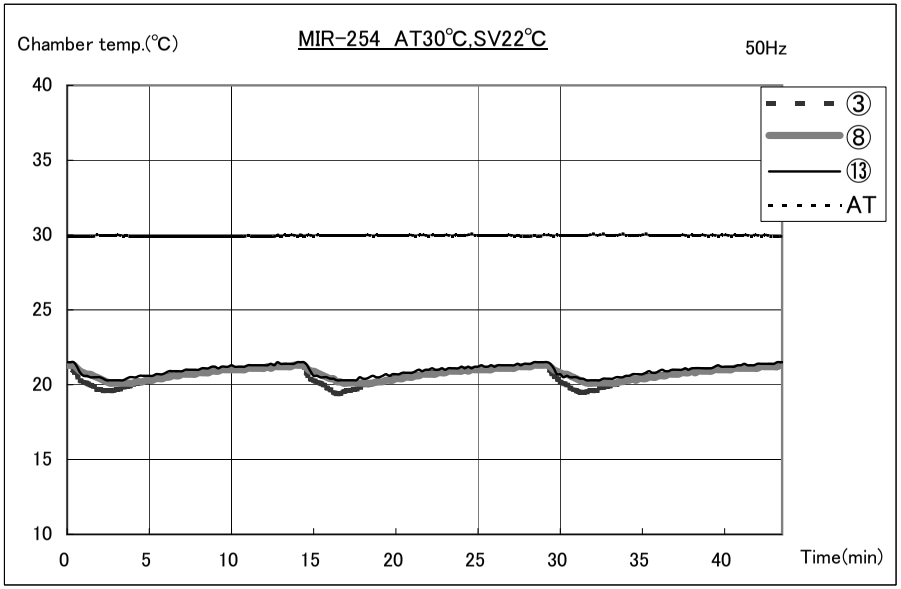
・SV22℃

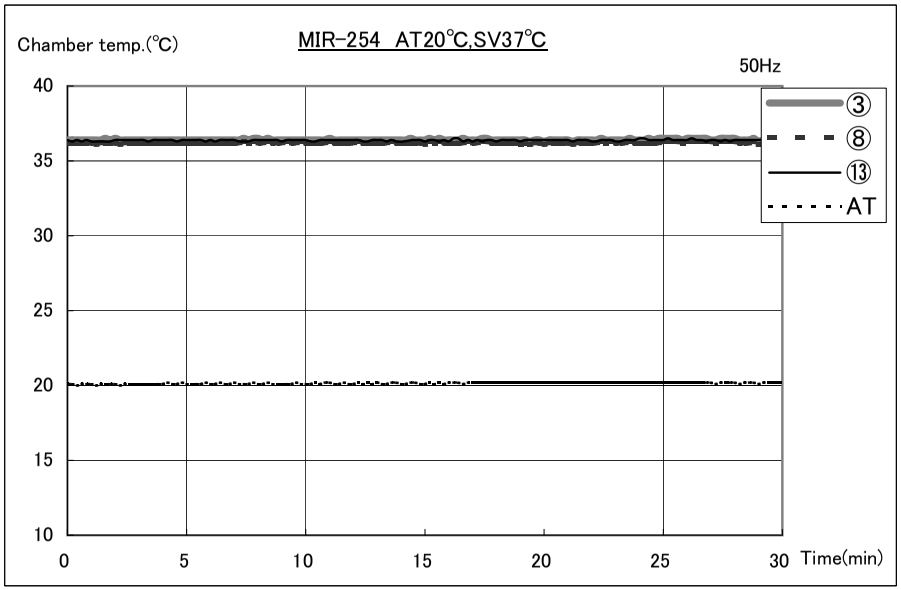
SV	22℃															
AT	20℃								30℃							
	50Hz				60Hz				50Hz				60Hz			
	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)
①	20.3	21.5	19.1	±1.2	20.1	21.5	18.8	±1.4	20.2	21.4	19.1	±1.2	20.2	21.4	19.0	±1.2
②	20.2	21.5	19.0	±1.3	20.0	21.5	18.6	±1.5	20.2	21.4	19.0	±1.2	20.1	21.4	18.9	±1.3
③	20.5	21.5	19.5	±1.0	20.4	21.5	19.3	±1.1	20.5	21.4	19.5	±1.0	20.5	21.4	19.5	±1.0
④	20.4	21.5	19.2	±1.2	20.2	21.5	18.9	±1.3	20.3	21.4	19.2	±1.1	20.3	21.4	19.1	±1.2
⑤	20.6	21.6	19.6	±1.0	20.5	21.6	19.4	±1.1	20.5	21.4	19.6	±0.9	20.5	21.5	19.5	±1.0
⑥	20.7	21.5	20.0	±0.8	20.6	21.5	19.8	±0.9	20.7	21.4	20.0	±0.7	20.6	21.4	19.9	±0.8
⑦	20.8	21.5	20.2	±0.7	20.8	21.5	20.1	±0.7	21.0	21.6	20.4	±0.6	21.0	21.7	20.3	±0.7
⑧	20.8	21.4	20.2	±0.6	20.7	21.4	20.0	±0.7	20.8	21.4	20.2	±0.6	20.8	21.4	20.1	±0.7
⑨	20.8	21.5	20.0	±0.8	20.7	21.5	19.9	±0.8	20.7	21.3	20.0	±0.6	20.6	21.3	19.8	±0.8
⑩	20.8	21.5	20.1	±0.7	20.7	21.5	20.0	±0.8	20.8	21.5	20.2	±0.6	20.8	21.6	20.0	±0.8
⑪	20.9	21.5	20.3	±0.6	20.8	21.5	20.2	±0.6	20.9	21.5	20.4	±0.6	20.9	21.6	20.2	±0.7
⑫	20.8	21.4	20.2	±0.6	20.8	21.4	20.1	±0.7	21.1	21.6	20.5	±0.6	21.1	21.7	20.4	±0.6
⑬	20.9	21.5	20.3	±0.6	20.8	21.6	20.1	±0.8	20.8	21.4	20.2	±0.6	20.7	21.4	20.1	±0.7
⑭	20.8	21.5	20.1	±0.7	20.7	21.5	19.9	±0.8	20.6	21.3	20.0	±0.6	20.6	21.4	19.9	±0.8
⑮	20.8	21.4	20.2	±0.6	20.8	21.5	20.1	±0.7	21.1	21.7	20.5	±0.6	21.1	21.7	20.5	±0.6

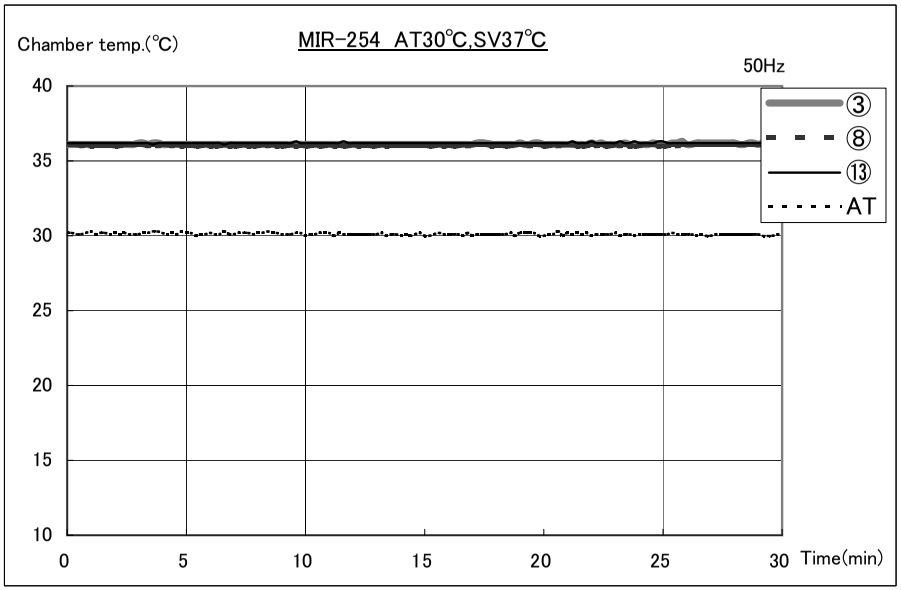
・SV37℃

SV	37℃															
AT	20℃								30℃							
	50Hz				60Hz				50Hz				60Hz			
	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)	Mid. Of cycle (℃)	Max. (℃)	Min. (℃)	Range (deg.)
①	36.5	36.6	36.4	±0.1	36.5	36.5	36.4	±0.1	36.3	36.4	36.2	±0.1	36.2	36.3	36.2	±0.1
②	36.5	36.5	36.4	±0.1	36.4	36.5	36.3	±0.1	36.3	36.4	36.2	±0.1	36.2	36.3	36.2	±0.1
③	36.3	36.4	36.2	±0.1	36.3	36.4	36.2	±0.1	36.3	36.4	36.2	±0.1	36.2	36.3	36.1	±0.1
④	36.6	36.7	36.5	±0.1	36.6	36.7	36.5	±0.1	36.4	36.4	36.3	±0.0	36.3	36.4	36.2	±0.1
⑤	36.4	36.5	36.3	±0.1	36.4	36.4	36.3	±0.1	36.4	36.5	36.3	±0.1	36.3	36.4	36.3	±0.1
⑥	36.1	36.2	36.0	±0.1	36.1	36.1	36.0	±0.0	36.2	36.3	36.2	±0.1	36.2	36.3	36.1	±0.1
⑦	35.5	35.6	35.3	±0.1	35.4	35.5	35.3	±0.1	36.0	36.1	35.9	±0.1	35.9	36.0	35.9	±0.0
⑧	36.1	36.2	36.0	±0.1	36.1	36.2	36.0	±0.1	36.2	36.2	36.1	±0.1	36.1	36.2	36.0	±0.1
⑨	37.0	37.1	36.9	±0.1	36.9	37.0	36.9	±0.0	36.2	36.3	36.1	±0.1	36.2	36.3	36.1	±0.1
⑩	36.7	36.7	36.6	±0.1	36.6	36.7	36.5	±0.1	36.3	36.4	36.2	±0.1	36.1	36.2	36.1	±0.0
⑪	36.3	36.4	36.2	±0.1	36.3	36.4	36.2	±0.1	36.1	36.2	36.0	±0.1	36.0	36.1	36.0	±0.1
⑫	36.1	36.3	36.0	±0.2	36.1	36.2	36.0	±0.1	35.9	36.0	35.8	±0.1	35.9	35.9	35.8	±0.1
⑬	36.5	36.6	36.4	±0.1	36.5	36.5	36.4	±0.1	36.1	36.2	36.0	±0.1	36.0	36.1	36.0	±0.1
⑭	36.6	36.6	36.5	±0.1	36.6	36.6	36.5	±0.1	36.1	36.2	36.0	±0.1	36.0	36.1	36.0	±0.1
⑮	36.1	36.2	36.0	±0.1	36.0	36.1	36.0	±0.1	35.9	35.9	35.8	±0.1	35.9	35.9	35.8	±0.1

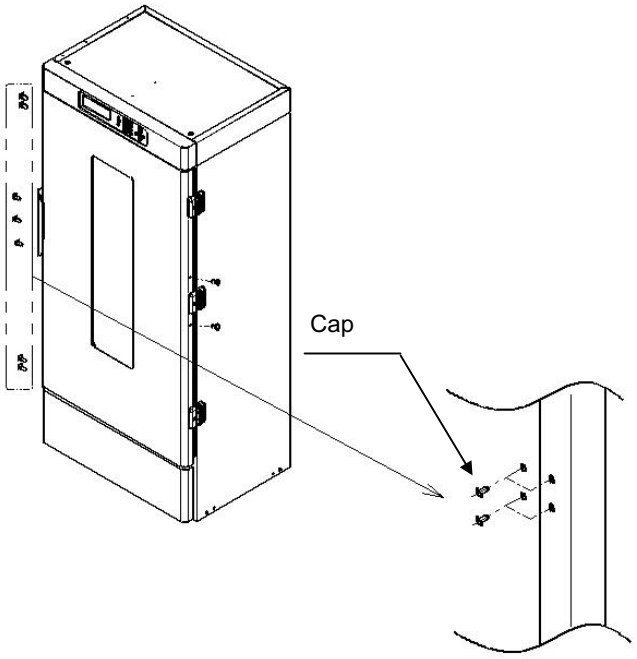

Chamber temp.(℃)
MIR-254 AT20℃,SV22℃
50Hz
40
35
30
25
20
15
10
0
60
120
180
240
300
Time(min)
③
⑧
⑬
AT


Chamber temp.(℃)
MIR-254 AT30℃,SV22℃
50Hz
40
35
30
25
20
15
10
0
5
10
15
20
25
30
35
40
Time(min)
③
⑧
⑬
AT


Chamber temp.(℃)
MIR-254 AT20℃,SV37℃
50Hz
40
35
30
25
20
15
10
0
5
10
15
20
25
30
Time(min)
③
⑧
⑬
AT


Chamber temp.(℃)
MIR-254 AT30℃,SV37℃
50Hz
40
35
30
25
20
15
10
0
5
10
15
20
25
30
Time(min)
③
⑧
⑬
AT

Procedure to reverse door



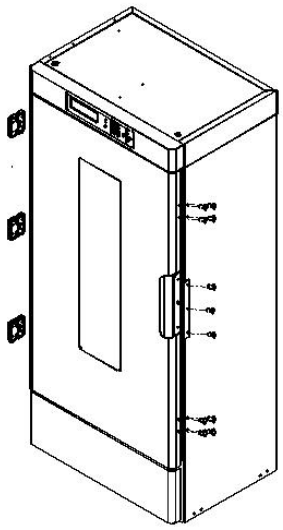
<Prior to reverse door>

Ensure to disconnect power cable from the outlet.

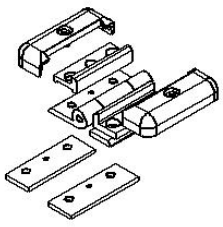
1. Remove caps from frame and door.
2. Loosen and remove screws from handle
3. Remove hinge cap from outer door.
4. Loosen and remove screws which secure the hinge.
5. Fit hinge and handle to opposite side.
6. Put caps in holes remained.

Note）Ensure to reverse hinge one by one.

Torque of screw: More than 80kgf/cm



Longer holes of hinge should be aligned to the frame side.



Quantity of shim supplied

＜MIR-154>

	Frame	Door
Upper	2	1
Lower	1	2

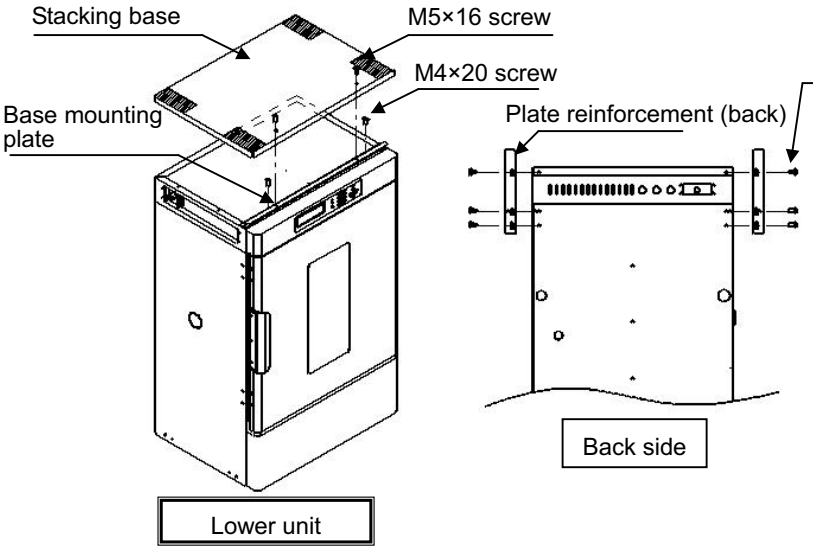
＜MIR-254>

	Frame	Door
Upper	2	1
Middle	1	1
Lower	1	2

※You should arrange appropriate numbers of shim upon your necessary.

Installation for 'Spacer of stacked module'（MIR-S154SB）

*** This is applicable for MIR-154 only.**



1. Remove screws from Top plate of lower unit.
   Fit Base mounting plate on the ceiling with screws which are enclosed with kit.
   Fit Base mounting plate and Stacking base then secure them with Plate reinforcement (back) as the drawing shows.

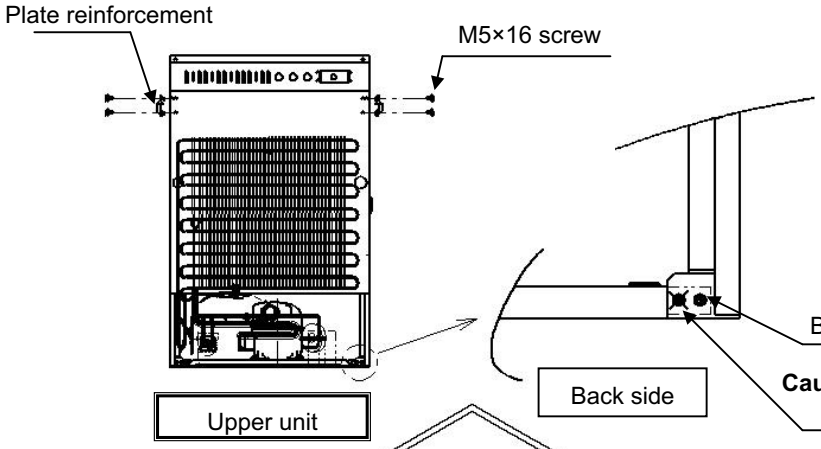
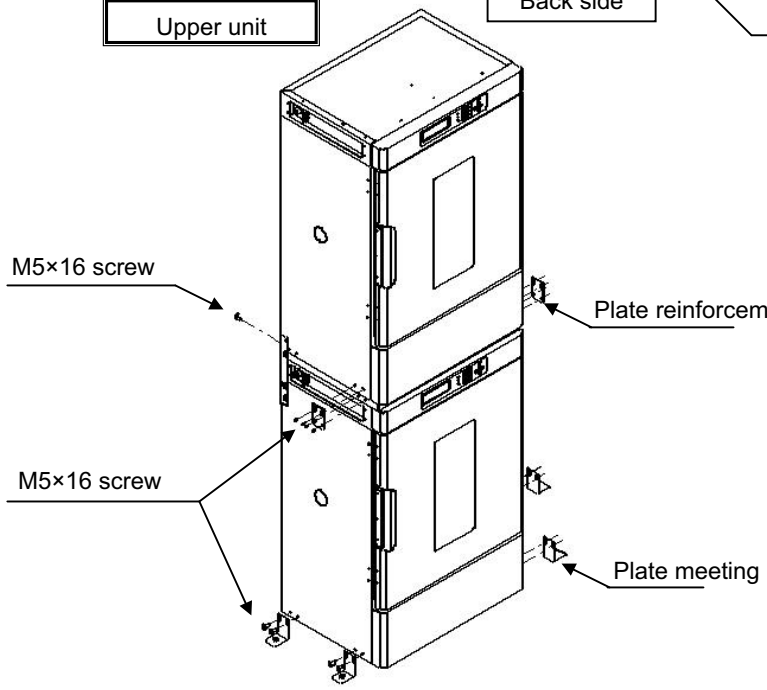


Plate reinforcement
M5×16 screw
Upper unit
Back side
Be sure to remote outer side screw
Caution! Don't loosen screw at inner side.
It may be caused the unit being fallen off.

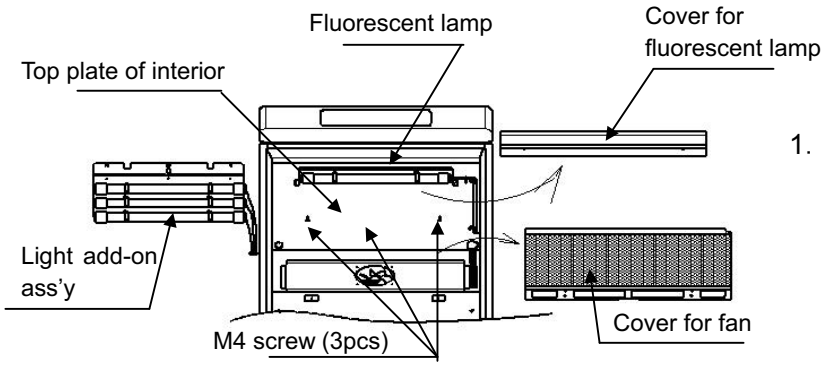
2. Fit the plate reinforcement to upper unit and remove outer side screw from left and right back.



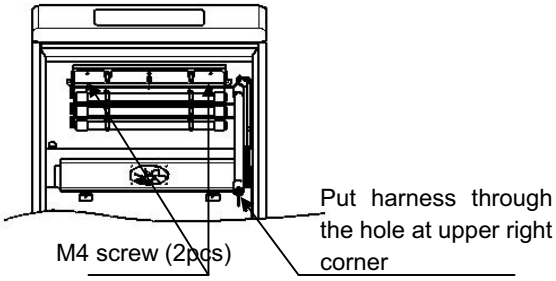
3. Secure Plate reinforcement (back) by screws at back side and secure Plate reinforcement (front) by screws at right and left side after stacked

Note) Be sure to fit Plate meeting and secure it by screw for earth-quake proof.

Installation for 'Light add-on kit'（MIR-L15）

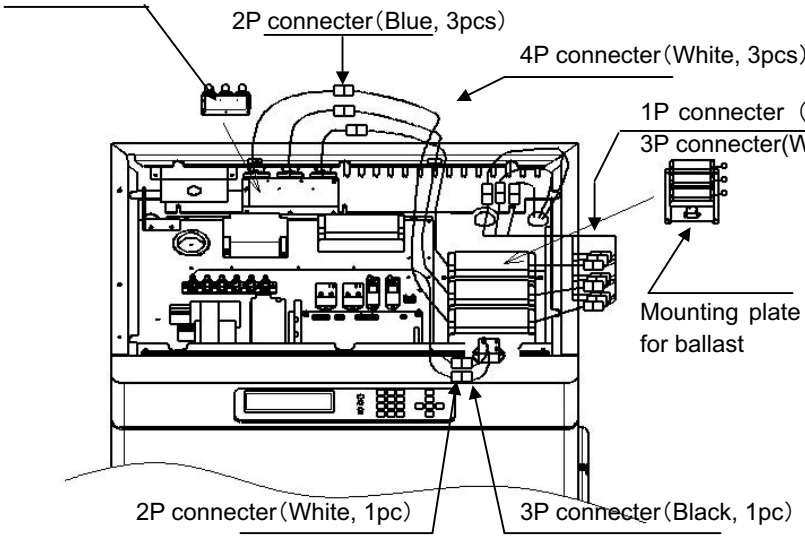


1. Remove the cover for fluorescent lamp, cover for fan and fluorescent lamp.
   Secure Light add-on ass'y temporally with top plate of interior by fixing M4 screws.



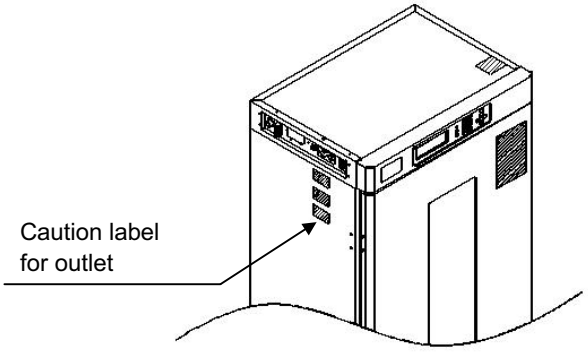
2. Loosen both right and left side screws from the original lamp, and tighten them with Light add-on ass'y.

3. Put the connecter of the plate through the hole at right back.



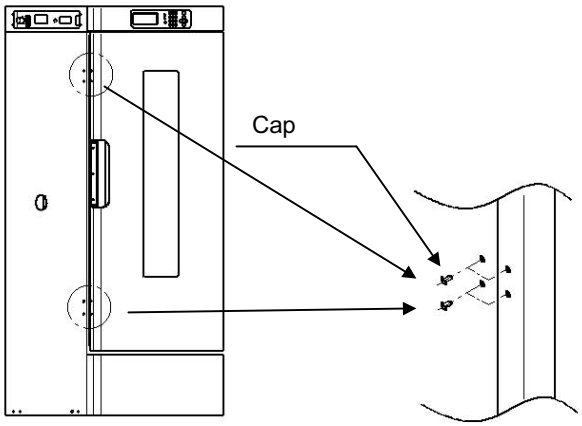
4. Fit the mounting plates for ballast and glow starter in the Electric box.
   Connecters should be connected with connecters which have same colors.

Note) Operation procedure for Lamp add-on kit should be referred to Instruction manual.

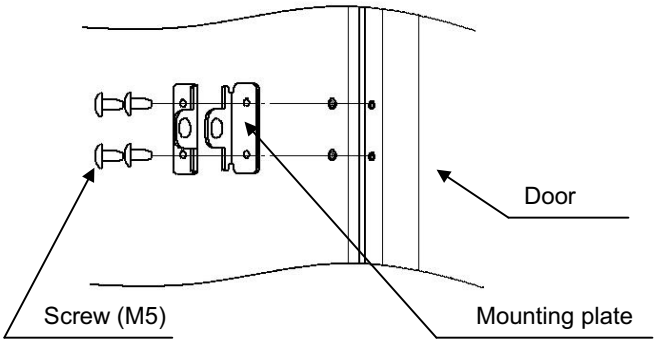


5. Put the caution label for outlet on the place where is specified by the drawing at left.

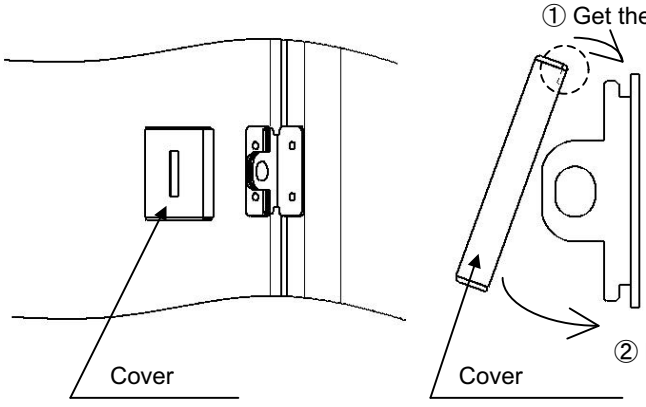
Installation for 'Key mounting plate'（MIP-LP）



1. Decide the alternative position to install 'Key mounting plate'.（Upper or lower）
2. Remove hinge and 4 caps on opposite side.



3. Install the mounting plate on the door secured by M5 screws.
   (M5 screws are enclosed with kit)



4. Align the cover and get the flange caught in the plate.

Instruction manual

・This section is extracted and printed from Instruction Manual.

・If you find out “Refer to page ●●” in them, this page means not page in Service manual but page in the lower corner of each page in the extract from Instruction Manual.
This page number is not corresponded with serial number in Service manual.

・**Please note the extracted Instruction Manual which corresponds to the initial unit production, so the contents may be revised in future.**

SANYO

INSTRUCTION MANUAL

MIR-154
MIR-254

Cooled Incubator

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INTRODUCTION

■ Read this manual carefully before using the appliance and follow the instructions for safety operation.

■ Sanyo never guarantee any safety if the appliance is used for any objects other than intended use or used by any procedures other than those mentioned in this manual.

■ Keep this manual in an adequate place to refer to it as necessary.

■ The contents of the manual will be subjected to change without notice due to the improvement of performance or functions.

■ Contact Sanyo sales representative or agent if any page of the manual is lost or page order is incorrect.

■ Contact Sanyo sales representative or agent if any point in this manual is unclear or if there are any inaccuracies.

■ No part of this manual may be reproduced in any form without the expressed written permission of Sanyo.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with this manual as it contains important safety advice.

Items and procedures are described so that you can use this unit correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:

⚠WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death.

⚠CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the unit and associated property.

Symbol shows;

△ this symbol means caution.

⃠ this symbol means an action is prohibited.

● this symbol means an instruction must be followed.

Be sure to keep this manual in a place accessible to users of this unit.

< Label on the unit >

This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent the electric shock.

The cover should be removed by a qualified engineer or a service personnel only.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Only qualified engineers or service personnel should install the unit. The installation by unqualified personnel may cause electric shock or fire.

Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

Never install the unit in a flammable or volatile location. This may cause explosion or fire.

Never install the unit where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.

Always ground (earth) the unit to prevent electric shock. If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

Connect the unit to a power source as indicated on the rating label attached to the unit. Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.

Never store volatile or flammable substances in this unit if the container cannot be sealed. These may cause explosion or fire.

Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit. This may cause electric shock or injury by accidental contact with moving parts.

Use this unit in safe area when treating the poison, harmful or radiate articles. Improper use may cause bad effect on your health or environment.

Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand. This may cause electric shock.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Never splash water directly onto the unit as this may cause electric shock or short circuit.

Never put containers with liquid on the unit as this may cause electric shock or short circuit when the liquid is spilled.

Never bind, process, or step on the power supply cord, or never damage or break the power supply plug. A broken supply cord or plug may cause fire or electric shock.

Do not use the supply cord if its plug is loose. Such supply cord may cause fire or electric shock.

Never disassemble, repair, or modify the unit yourself. Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.

Disconnect the power supply plug if there is something wrong with the unit. Continued abnormal operation may cause electric shock or fire.

When removing the plug from the power supply outlet, grip the power supply plug, not the cord. Pulling the cord may result in electric shock or fire by short circuit.

Disconnect the power supply plug before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.

Disconnect the power plug when the unit is not used for long periods. Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.

If the unit is to be stored unused in an unsupervised area for an extended period, **ensure that children do not have access and that doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Remove doors to prevent accidents such as suffocation.

Do not put the packing plastic bag within reach of children as suffocation may result.

PRECAUTIONS FOR SAFE OPERATION

⚠CAUTION

Use a dedicated power source (a dedicated circuit with a breaker) as indicated on the rating label attached to the unit. A branched circuit may cause fire resulting from abnormal heating.

Connect the power supply plug to the power source firmly after removing the dust on the plug. A dusty plug or improper insertion may cause a heat or ignition.

Never store corrosive substances such as acid or alkali in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.

Check the setting when starting up of operation after power failure or turning off of power switch. The stored items may be damaged due to the change of setting.

Be careful not to tip over the unit during movement to prevent damage or injury.

Prepare a safety check sheet when you request any repair or maintenance for the safety of service personnel.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC61010-1):

■ Indoor use;

■ Altitude up to 2000 m;

■ Ambient temperature 5°C to 40°C

■ Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C;

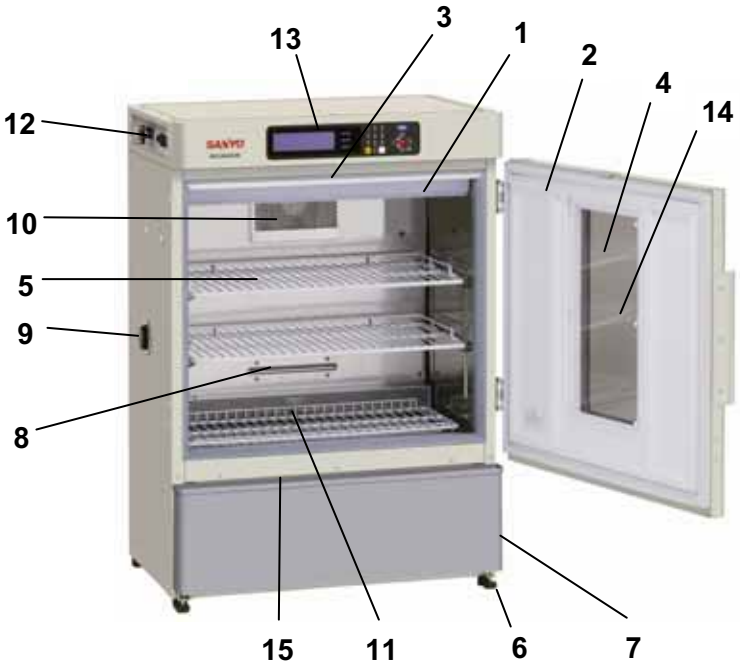
■ Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage;

■ Other supply voltage fluctuations as stated by the manufacturer;

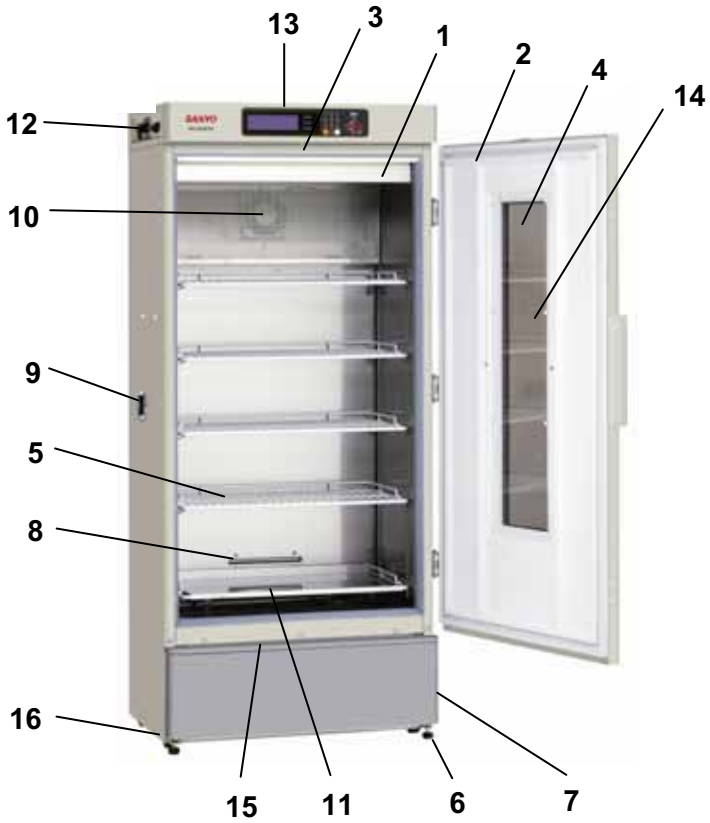
■ Transient overvoltages according to Installation Categories (Overvoltage Categories) II; For mains supply the minimum and normal category is II;

■ Pollution degree 2 in accordance with IEC 60664.

INCUBATOR COMPONENTS



MIR-154



MIR-254

INCUBATOR COMPONENTS

1. Shade: To protect the fluorescent lamp.

2. Door: The door can be opened to 130 degree approx. The door is sealed securely to the cabinet by the magnetic gasket when it is closed.

3. Door switch: To prevent the air from escaping by stopping the air circulating fan when the door is opened.

4. Glass window: 3-layer heat-absorbing glass to shut out the heat.

5. Shelf: The location (height) is adjustable according to the item size to be stored.

6. Leveling foot: Use these bolts to adjust the height and level the unit for installation.

7. Evaporating tray: The drained water resulting from the defrosting is accumulated and evaporated automatically in this tray.

8. Frost check opening: Check the frost on the condenser through this opening.

9. Access port: This port allows cables to be passed into the cabinet.
Note: Be sure to set the rubber stopping to the hole for measurement (placed at the left side) as it was when passing cables for measurement and power cords through it.
Be sure to replace the cap after take out cable or, the inside temperature cannot complete down, and frost may accumulate outside the port surroundings.

10. Air circulating fan: Fan is installed inside the duct. Do not insert anything into the duct.

11. Drain port: Use this port when the chamber is washed with water. Always cover the port with cap when no use.

12. Switch box: Power switch, remote alarm terminals, and glow starter are placed.

13. Control panel: Temperature control, alarm setting, program setting are available through the control panel. The temperature indicator is attached on the control panel.

14. Glass protective plate : This is prevented from glass cracking. Use shading glass protective plate (sold separately)（MIR-154BP/254BP）when shading the window for observation.

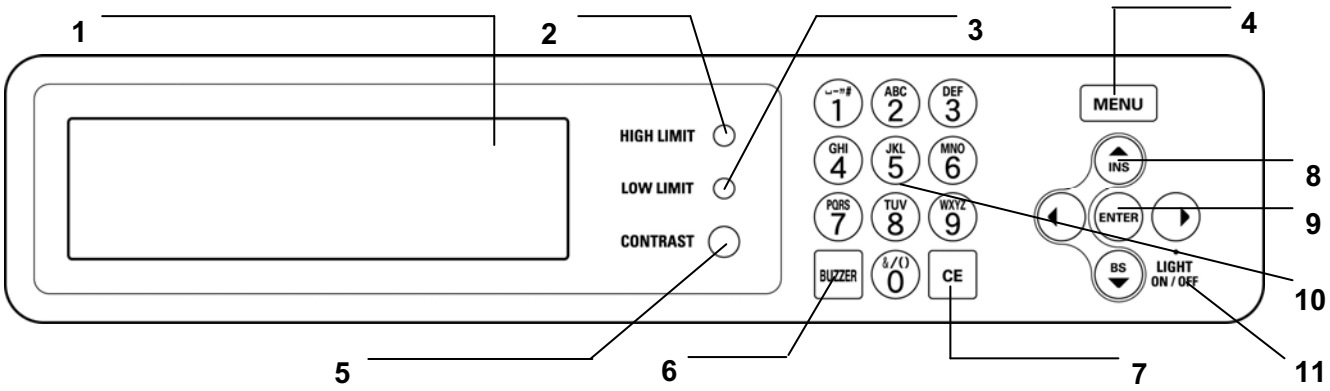
15. Dew saucer : To hold the dew that adhere to inside of the door.

16. Caster (MIR-254 only): To facilitate the moving of the cabinet.

As for the unique features of this product, reducing compressor vibration and reversible door fitting, please contact Sanyo sales representative or agent.

INCUBATOR COMPONENTS

Control panel



1. LCD panel

2. High limit temperature alarm volume (HIGH LIMIT)
To set the temperature of high limit temperature alarm.

3. Low limit temperature alarm volume (LOW LIMIT)
To set the temperature of low limit temperature alarm.

4. Menu button (MENU)
To open the menu window.

5. LCD contrast adjusting knob
To adjust the contrast of graphic LCD.

6. Alarm buzzer stop key (BUZZER)
To silence the alarm buzzer temporarily.

7. Clear key (CE)
To clear the input value during editing of program.

8. Shift key (Upward, downward, rightward, leftward)
To move the cursor on the LCD panel.

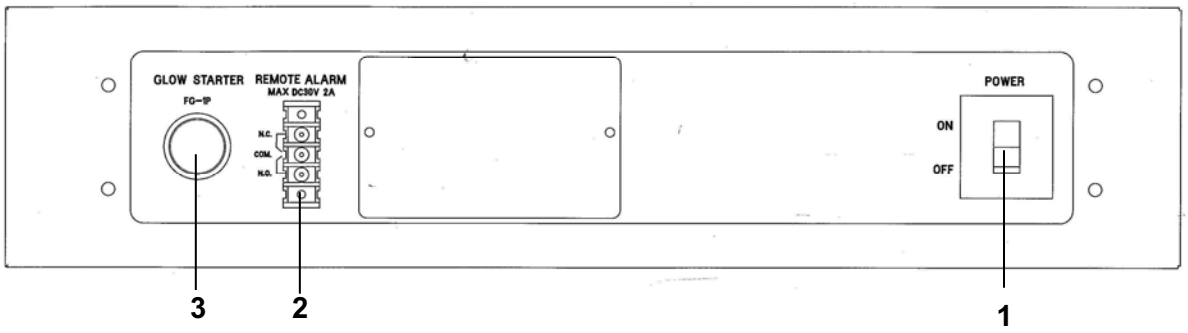
9. Enter key (ENTER)
To determine the selection of menu. In program editing, pressing this key causes moving to a next article.

10. Character input key

11. Fluorescent lamp key (LIGHT ON/OFF)

INCUBATOR COMPONENTS

Switch box



1. Power switch (POWER)

The switch for ON/OFF of all power source including the plug outlet.

2. Remote alarm terminals

Alarm signal can be drawn out via the contact output. Permissible contact capacity : DC30 V・2 A

a) Contact output: Connect the lead wires to COM and NO terminals.
(open when normal condition, close when abnormal condition)

b) Contact output: Connect the lead wires to COM and NC terminals.
(close when normal condition, open when abnormal condition)

COM and NO terminals are closed at the failure of electricity supply.

3. Glow starter (Product number: FG-1P）

INSTALLATION SITE

To operate this unit properly and to obtain maximum performance, install the unit in a location with the following conditions:

■ A location not subjected to direct sunlight
Do not install the unit under direct sunlight. Installation in a location subjected to direct sunlight cannot obtain the intended performance.

■ A location with adequate ventilation
Leave at least 10 cm around the unit for ventilation. Poor ventilation will result in a reduction of the performance and consequently the failure.

■ A location away from heat generating sources
Avoid installing the unit near heat-emitting appliances such as a heater or a boiler etc. Heat can decrease the intended performance of the unit.

■ A location with little temperature change
Install the unit under stable ambient temperature. The allowable ambient temperature is between +5 and +35°C.
Note: This incubator changes to PID control when the temperature setting is about 7°C higher than the ambient temperature. Under PID control, the temperature cycle is very small. For other temperature setting, the incubator is operated with ON-OFF control, which temperature cycle is about 3°C. At the beginning of operation or when the ambient temperature is fairly high, the cabinet side may heat up. However, this does not denote a malfunction. It is due to the hot gas piped around the unit frame to prevent condensation around the cabinet.

■ A location with a sturdy and level floor
Always install the unit on a sturdy and level floor. The uneven floor or tilted installation may cause failure or injury. Install the unit in stable condition to avoid the vibration or noise. Unstable condition may cause vibration or noise.

⚠ WARNING
Install the unit on a sturdy floor. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.
Select a level and sturdy floor for installation. This precaution will prevent the unit from tipping. Improper installation may result in water spillage or injury from the unit tipping over.

■ A location not prone to high humidity
Install the unit in the ambient of 80% R.H. or less humidity. Installation under high humidity may cause current leakage or electric shock.

⚠ WARNING
Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.
Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

■ A location without flammable or corrosive gas
Never install the unit in a flammable or volatile location. This may cause explosion or fire or may result in the current leakage or electric shock by the corrosion of the electrical components.

INSTALLATION SITE

> **⚠ CAUTION**
> Do not install it on the place (near the drain facilities etc.) where the corrosion cause material like the sulfur compound etc. might be generated. The refrigeration unit is deteriorated, and it causes the breakdown of the product due to the corrosion of the copper pipe.

■ A location where noting falls on
Do not install the product where things might fall on it. The product might be damaged, and it causes a breakdown.

INSTALLATION

1. Remove the packaging materials and tapes
Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the panels with a dry cloth.

Leveling foot

2. Adjust the leveling foot
Extend the leveling feet by rotating them counterclockwise to contact them to the floor. Ensure the unit is level.

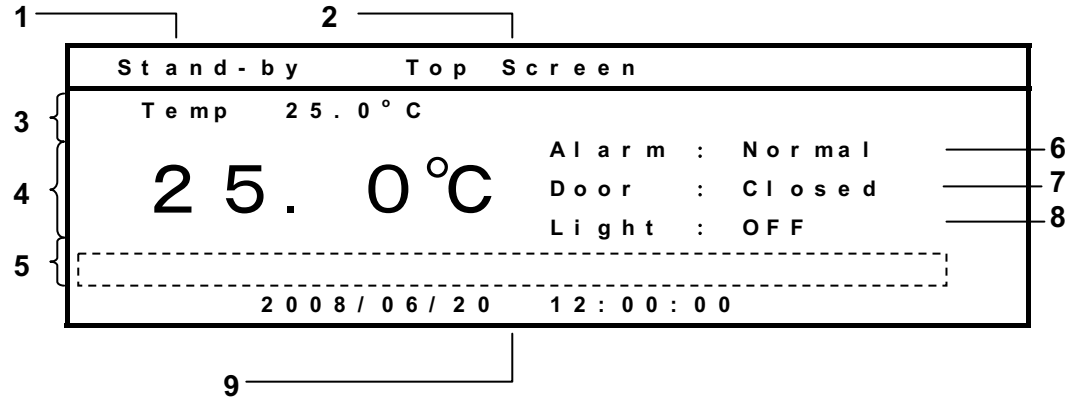
3. Ground (earth)

> **⚠WARNING**
> **Use a power supply outlet with ground (earth)** to prevent electric shock. If the power supply outlet is not grounded, it is necessary to install a ground by qualified engineers.
> **Never ground the unit through a gas pipe, water main, telephone line or lightning rod.** Such grounding may cause electric shock in the case of an incomplete circuit.

Note:
The chamber temperature may deviate from the set temperature when the unit is running with the heater or motor energized.

TOP SCREEN

The top screen below is displayed when turning on the power switch. The default temp. is 25.0°C. The date and time are preset at the factory. Refer to page 36 when more accurate setting is needed.



1. Display of running status

The current running status is displayed. At the power-on, “stand-by” is displayed and the system runs continuously under the stand-by running condition (refer to page 16). When turning on power for the first time, the system runs continuously under the initial setting condition.

“Running” is displayed at the time of programmed running. “Defrosting” is displayed while removing frost.

2. Display of program name

A program name under operation is displayed. “Top Screen” is displayed during standby operation.

3. Display of setting

Set value of temperature is displayed.

4. Display of current value

Current value of temperature is displayed.

5. Message display field

A message is displayed when a breakdown occurs.

6. Alarm display（Alarm）

“Alarm “ is alternately displayed by reversed/non-reversed character while alarm is operating.

“Warning“ is alternately displayed by reversed/non-reversed character at the time of warning.

“Normal“ is displayed at a normal condition.

An adding message is displayed in the message display field.

7. Display of door status

“Door” is highlighted when the door is open. “Closed” is displayed when the door is closed.

8. Lighting display (Light)

“ON” is displayed in outline type when the lighting has been turned on. “OFF” is displayed when turned off. When the lighting is set to be turned on, the system is programmed running, “Program_ON” is displayed in outline type when the lighting has been turned on and “Program_OFF” is displayed in outline type when the lighting has been turned off.

9. Display of date and time

The current date and time is displayed.

FUNCTIONS THROUGH CONTROL PANEL

The following functions are available through control panel:

■ **Setting of standby operation:** To set a running condition at the start-up or completion of programmed running. (refer to page 16)

■ **Programming and edit:** To set a new program (page 19), or to edit (page 25), or delete (page 40) an user program.

■ **Programmed running:** To start (page 26), skip (page 29) or stop (page 30) a programmed running.

■ **Setting of defrost:** To set the automatic defrost (page 31) and to start the manual defrost. (page 32)

■ **Setting of log cycle and sending to PC:** To set a log cycle of running data and to send a running log to PC. (page 35)

■ **Setting of date and time:** To set the date and time shown on the top screen. (page 36)

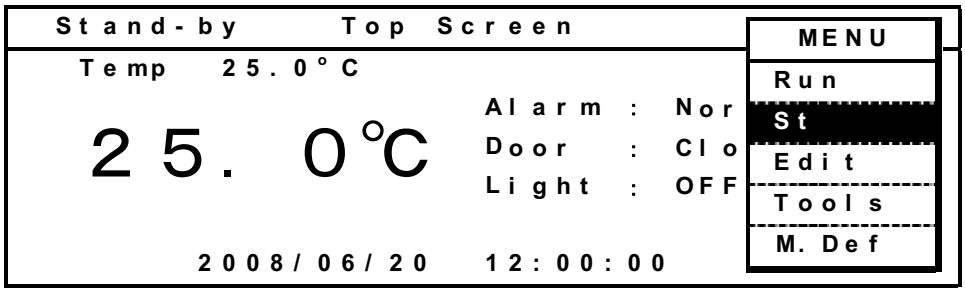
■ **Setting of alarm:** To set temperature alarm (page 37) and a high limit (or low limit) temperature alarm. (page 18)

■ **Default setting:** To set the default for LCD panel and communication (DAQ) speed etc. (page 39)

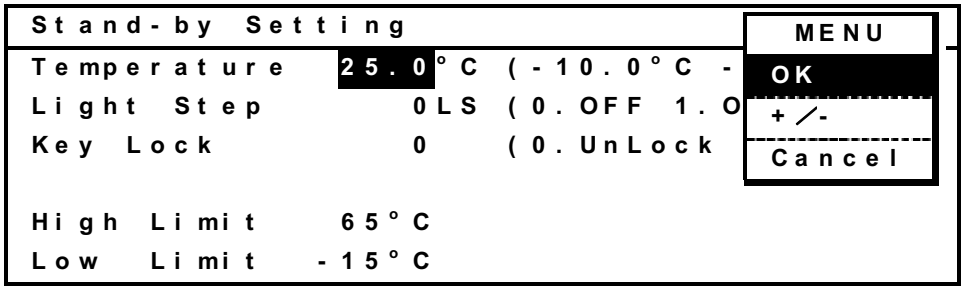
STANDBY OPERATION (MENU/Std-by)

This product automatically operates with standby operation setting.

1. With the top screen displayed, press the menu button (MENU) to show the menu window. Select "Std-by" and press the enter key (ENTER).



2. Stand-by Setting screen is displayed. Set each parameter.



3. Press the menu button (MENU) at the completion of parameter setting. The menu window is shown. Select "OK" and press the enter key (ENTER). The parameter is memorized.

The settable range of each parameter:

■ Temperature : -10～60°C

■ Light step : 1 (ON) or 0 (OFF). In the case of selecting 0 (OFF), by pressing rightward shift key, lighting is turned on or off when the top screen is displayed.

STANDBY OPERATION (MENU/Std-by)

However, except when the set value of temperature is between +5～+50°C, the lighting is turned off, regardless of the setting. (During programmed running, on/off of lighting depends on the program.)

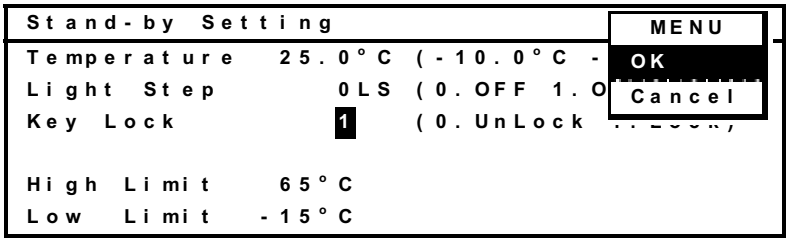
■ Key Lock : When selecting 1 (Lock), it is not possible to change any parameter. To unlock, it is required to input the key lock password.

Refer the next for the details.

SETTING OF Key Lock（MENU/Std-by）

Setting of Key Lock（Key Lock）

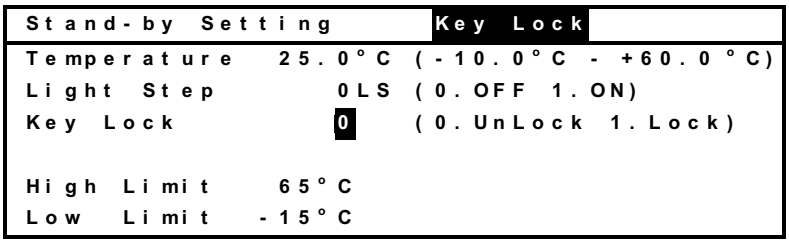
1. When setting of key lock, change the value of the key lock line from “0” to “1” in the stand-by setting screen（Stand-by Setting） and press the enter key（ENTER）. The buzzer rings for a short while, and then the key is locked.



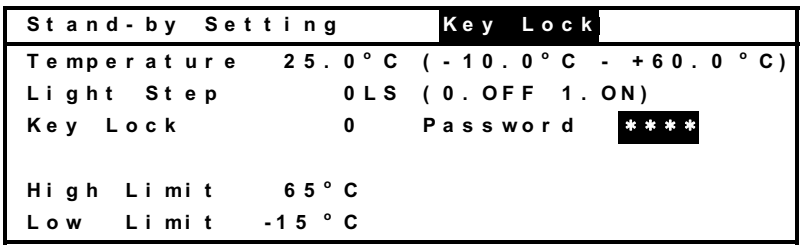
2. The other settings except key lock cannot be changed.

Setting of Key Unlock（Key Unlock）

1. When setting of key unlock, change the value of the key lock line from “1” to “0” in the stand-by setting screen（Stand-by Setting） and press the enter key（ENTER）.



2. Input password of 4 digits to the password field（Password） where the cursor is moved to, and press the enter key（ENTER）. When setting of key unlock, the buzzer rings for a short while, and then “Key Lock” disappears in the stand-by setting screen（Stand-by Setting）.



Caution: The buzzer rings for a long time when a wrong password is input. Input a correct password.

The password for key unlock must be shared and administered by all users on this product.

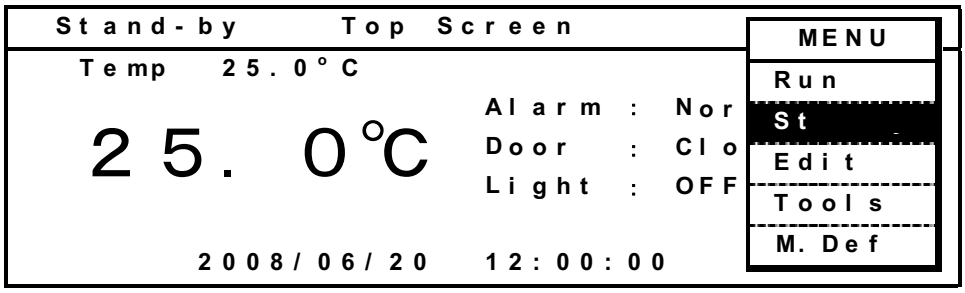
The setting of key unlock when shipped from the factory is “0000”.

Refer to page 38 for changing the password.

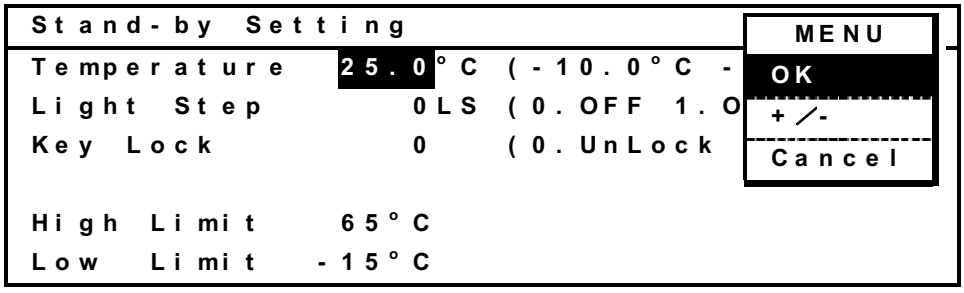
HIGH LIMIT/LOW LIMIT ALARM (MENU/Std-by)

A high limit temperature alarm and low limit temperature alarm are provided with this product. The alarm temperature can be changed as follows:

1. With the top screen displayed, press the menu button (MENU) to show the menu window. Select "Std-by", and press the enter key (ENTER).



2. Stand-by Setting screen is displayed.



3. Set the desired high limit temperature alarm by turning the high limit temperature alarm volume (HIGH LIMIT) at the center of the control panel by using a small screw driver. The settable alarm temperature is between 15.0°C and 65.0°C.

Note:

Set the high limit temperature alarm (High Limit) 5°C or more higher than the maximum temperature in a program.

4. Set the desired low limit temperature alarm by turning the low limit temperature alarm volume (LOW LIMIT) at the center of the control panel by using a small screw driver. The settable alarm temperature is between -15.0°C and 20.0°C.

Note:

Set the low limit temperature alarm (Low Limit) 5°C or more lower than the minimum temperature in a program.

5. Press the menu button (MENU) at the completion of setting. The menu window is shown. Select "OK" and press the enter key (ENTER). The alarm temperature is memorized.

Refer to alarms and safety functions of page 43 for details.

Note:

High limit temperature alarm (High Limit) and low limit temperature alarm (Low Limit) are effective during a programmed running as well.

At any time when Stand-by Setting screen is not displayed, turning the high and low limit temperature alarm volume (HIGH LIMIT or LOW LIMIT) causes change of the setting value.

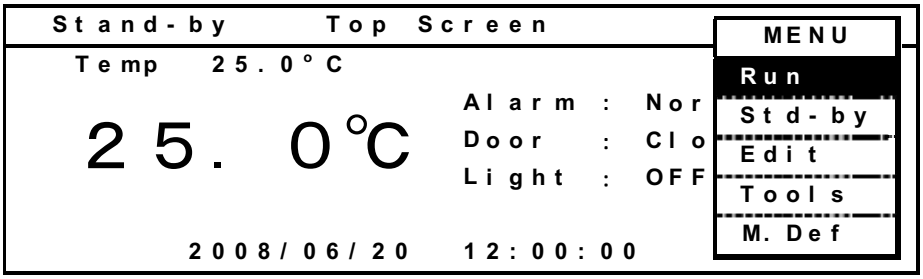
PROGRAMMING (MENU/Edit)

This product has two modes, which are clock mode and timer mode. The clock mode is used to set a change time to the next step in a day time (24 hours). The timer mode is used to set a time for each step directly and the remained time is displayed.
The selection of either mode is available on the running mode selection screen at the starting of the program.

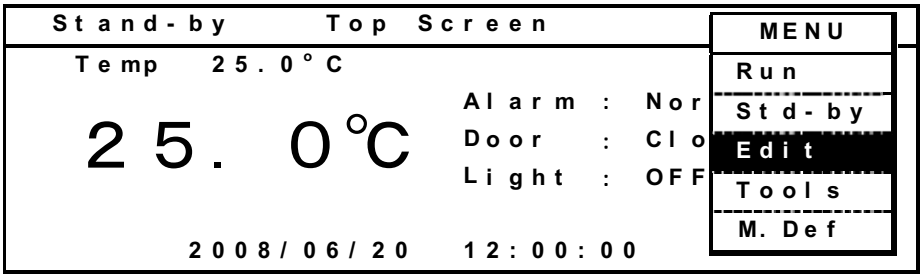
Example 1:
Following shows the procedure to create a new program “Oze” of which cycle is 31 with clock mode. The details of “Oze” is as follows:

Start time (H)	6:00	9:00	11:00	13:00	15:00	17:00	19:00	21:00	22:00	23:00	6:00
Temp (°C)		12	15	20	25	20	18	15	15	12	10
Lighting		0	1	0	1	0	1	0	1	0	1

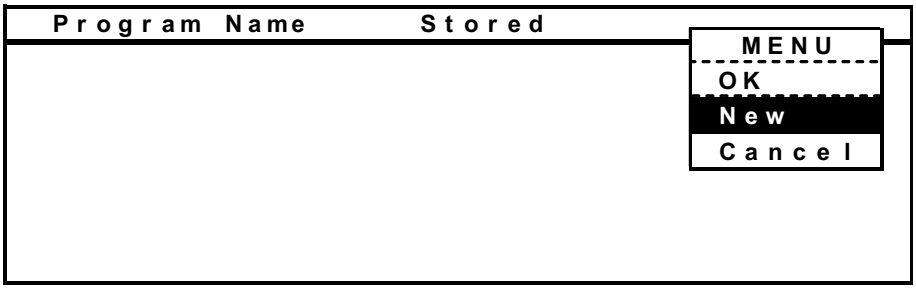
1. With the top screen displayed, press the menu button (MENU) to show the menu window.



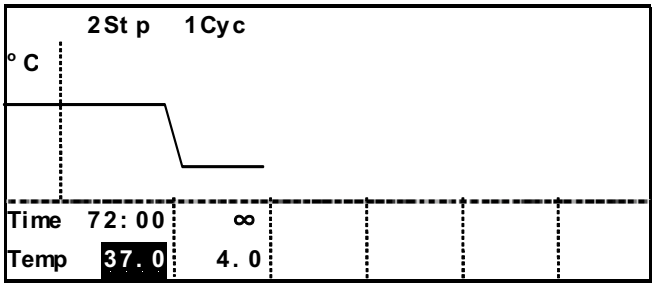
2. Select “Edit”, and push the enter key (ENTER).



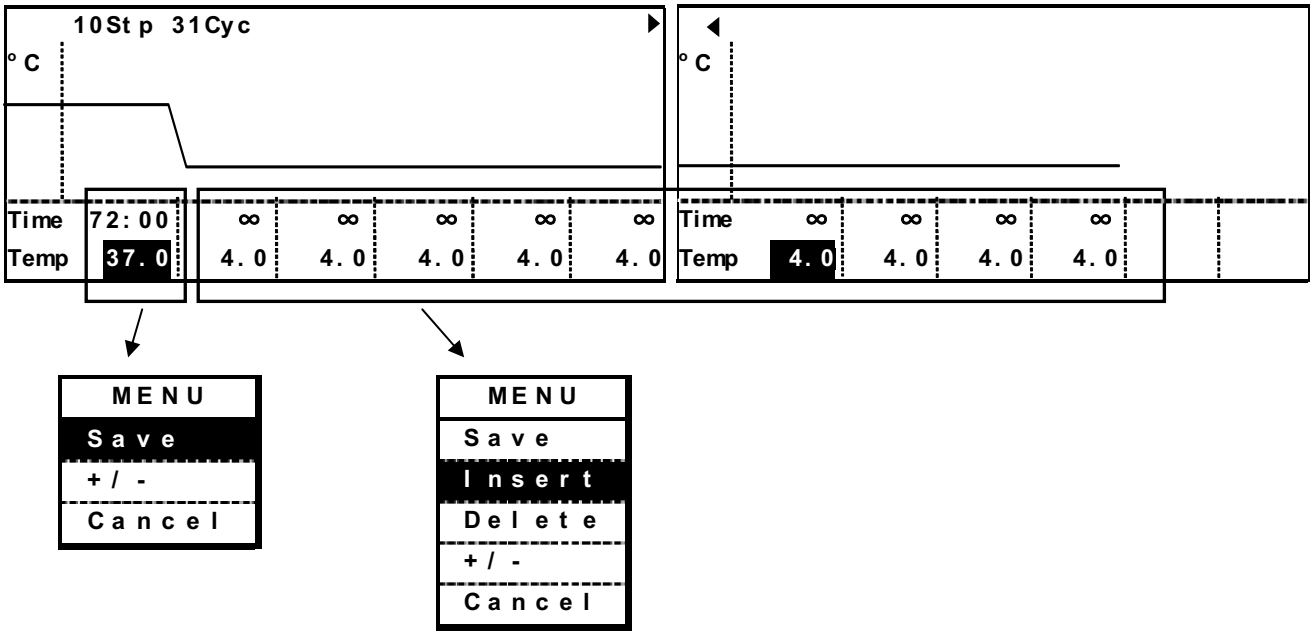
3. The Program Name Stored screen is opened. Press the menu button (MENU) and select “New”, and press the enter key (ENTER). The program names are displayed when some programs have already been saved.



4. A model program is displayed.

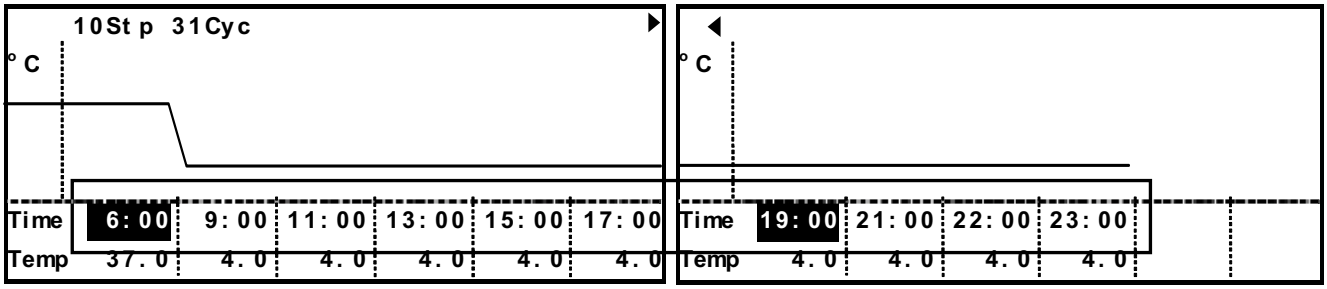


The step number (Stp :step) and cycle number (Cyc :repeat number) can be changed on the top left corner (2Stp 1Cyc) of the screen. Highlight the numerical value by shift key, and input 10Stp 31Cyc by character input key. The step number and cycle number are changed. The screen is scrolled to the next page by using the rightward shift key.



The step number (Spt) can be changed by “Insert” or “Delete” on the menu window. Press the menu button (MENU), to open the menu window. The menu window for a first section has no “Insert” or “Delete”. Therefore, neither insert nor delete is effective for the first section. The maximum step number is 12. The cycle number is 1 when the step number is 1. The settable cycle number is up to 98. The cycle number 99 means limitless repeat.

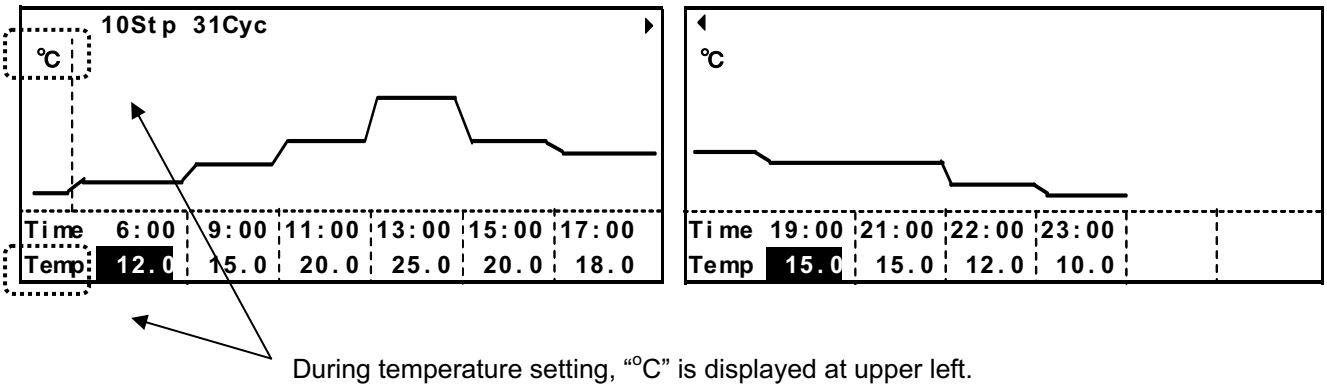
5. Highlight the numerical value of each time section (Time) by shift key, and input as below by character input key.



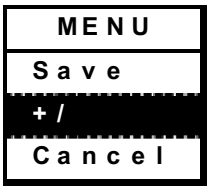
⚠CAUTION

The time setting value depends on each mode, clock mode and timer mode. In the case of clock mode, the setting range is between 00:00 and 23:59. If the setting is larger than 24:00, the step of immediately before is repeated limitlessly. Set the step with timer order. In the case of timer mode, setting range is between 00:01 and 99:59. The setting of "99:99" causes limitless repeat.

6. Shift a cursor downward by the downward shift key. Set the temperature as follows. The setting range is between -10.0°C and 60.0°C.



During temperature setting, "°C" is displayed at upper left.



When adding the "–" to the set value of temperature or erasing the "–" from the set value of temperature, press the menu button (MENU) to show the menu window. Select +/- and press the enter key (ENTER).

⚠CAUTION

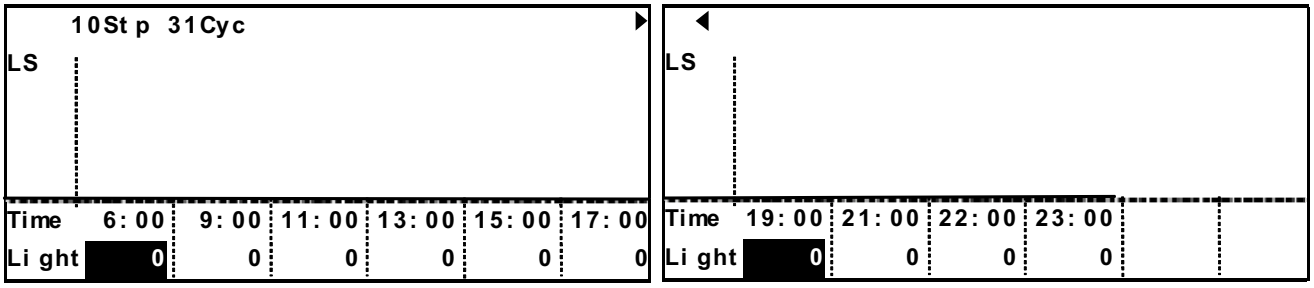
The settable temperature is between -10.0°C and 60.0°C, but the temperature control range is between 5°C and 50°C when the light is ON. The temperature control range is between 20°C and 50°C when light add-on kit (MIR-L15; sold separately) is installed.

⚠CAUTION

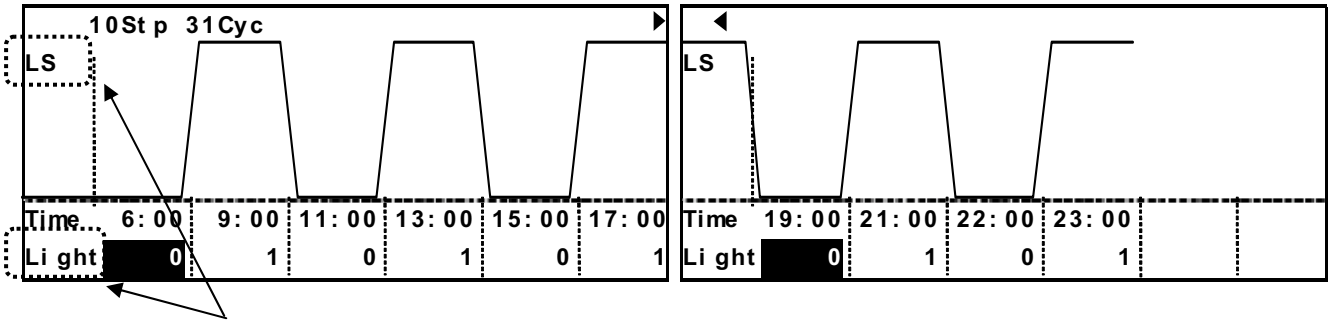
The unit continues to run with a step just before the step having time setting of over 24:00 when a program is run in clock mode.

PROGRAMMING (MENU/Edit)

7. Shifting a cursor downward by downward shift key moves to the next edit “Light” (light step).

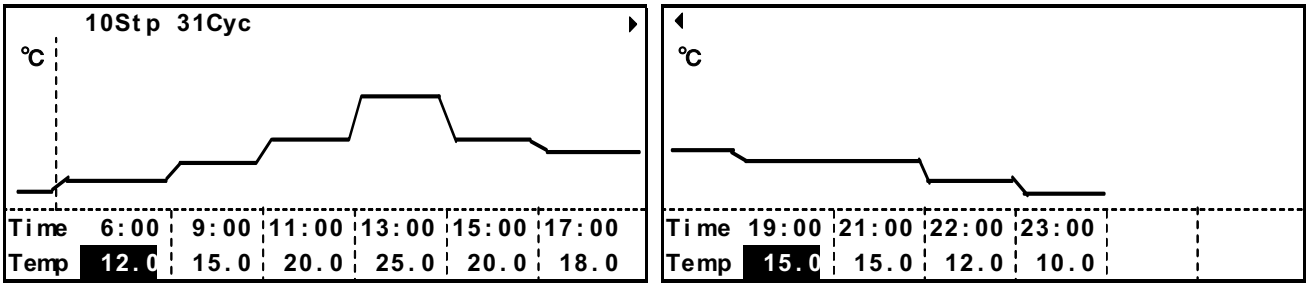


Set a light step as below. To set 0(OFF) or 1(ON).

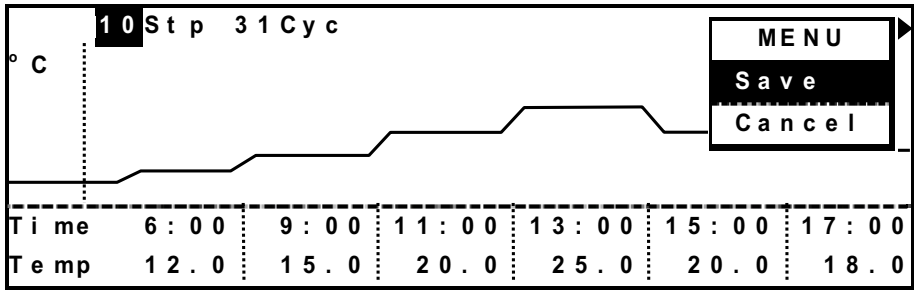


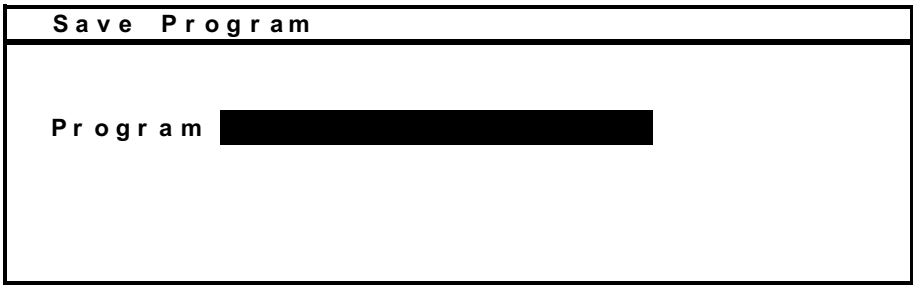
When setting Light step, ″LS” displayed at the upper left and ″Light” at the lower left on the top screen.

8. Shifting a cursor downward by downward shift key moves to the next edit “Temp” (Temperature).

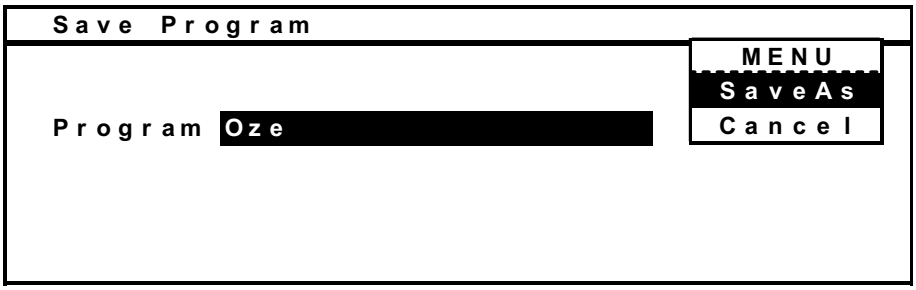


9. At the completion of all input, press the menu button (MENU) to show the menu window. Select “Save”, and press the enter key (ENTER). Save Program screen is opened.





10. Input a program name (Oze), and press the menu button (MENU) to show the menu window. Select “Save As”, and press the enter key (ENTER). The program is entered. The maximum numbers of character for program name is 16. Refer to edit function of characters described below. Up to 10 programs are created and saved.



Edit function of characters

Shift key

- **Upward shift key** : Space insertion
- **Downward shift key** : backspace
- **Leftward shift key** : Move a cursor left
- **Rightward shift key** : Move a cursor right

Character input key

1 key : space,-,”,#,@,1 **2 key** : A,B,C,a,b,c,2 **3 key** : D,E,F,d,e,f,3
4 key : G,H,I,g,h,i,4 **5 key** : J,K,L,j,k,l,5 **6 key** : M,N,O,m,n,o,6
7 key : P,Q,R,S,p,q,r,s,7 **8 key** : T,U,V,t,u,v,8 **9 key** : W,X,Y,Z,w,x,y,z,9 **0 key** : &,/,(,),.,0

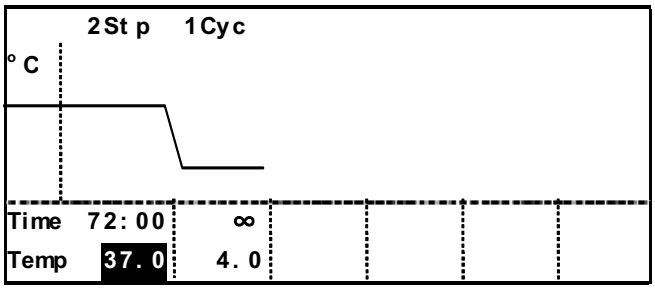
11. Return to the top screen after saving program.

Example 2:

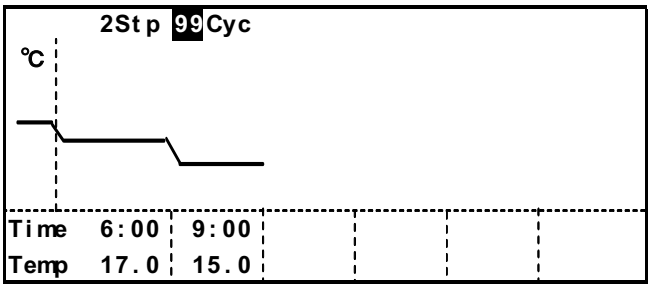
To create the following program with timer mode and name “NIKKO”. The cycle is 99, that is limitless repeat.

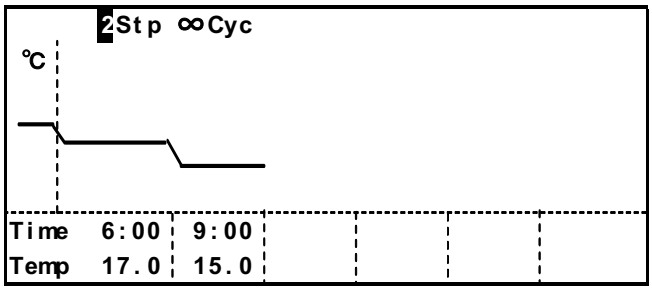
Step Time	48	36
Temperature(°C)	20	30
Light Step	0	1

1. Display a model program as shown on page 19.

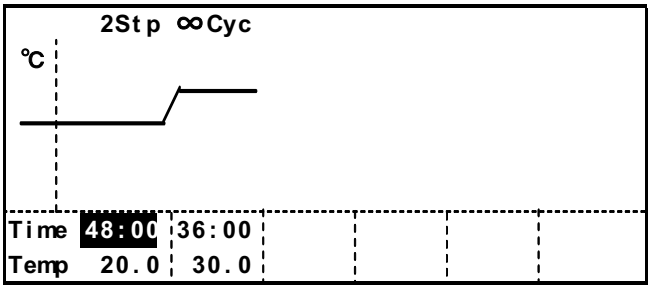


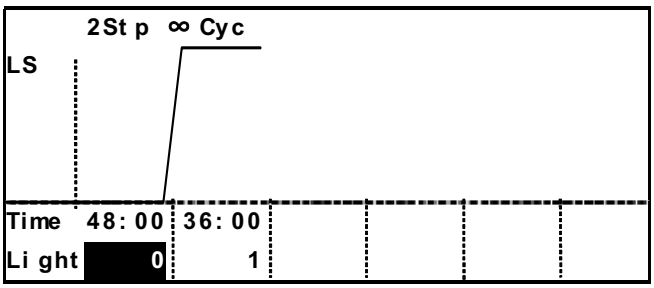
Change the step number and cycle number to 2Stp and 99Cyc by character input key. Only one page is displayed and 99 is changed into ∞. Display of ∞ changes 99 when lapped by a cursor.





2. Set a time, temperature and light step as same as Example.1.

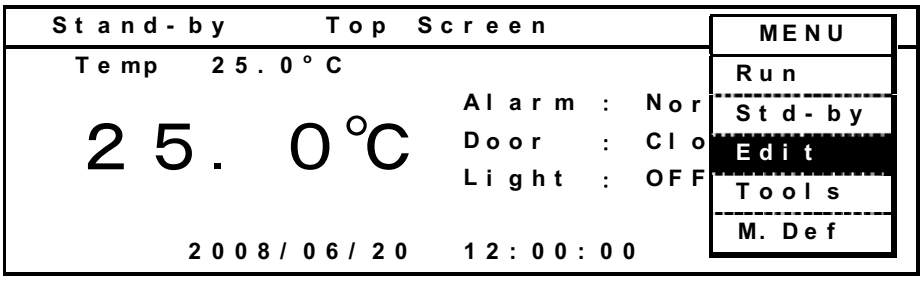




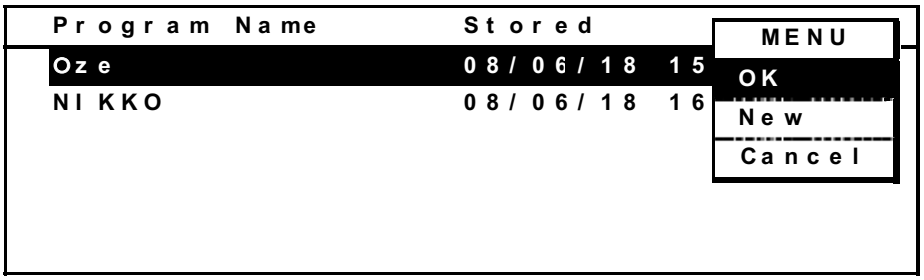
3. Input a program name (NIKKO), pres the menu button (MENU) to show the menu window. Select “Save As”, and press the enter key (ENTER) to save the program as same as Example.1.

EDIT OF SAVED PROGRAM (MENU/Edit)

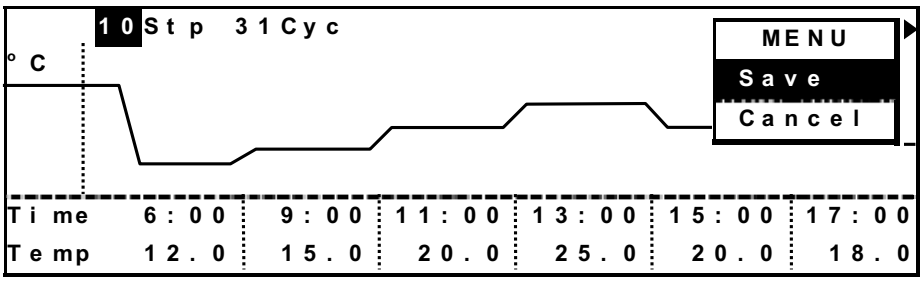
1. With the top screen displayed, press the menu button (MENU) to show the menu window. Select “Edit”, and press the enter key (ENTER).



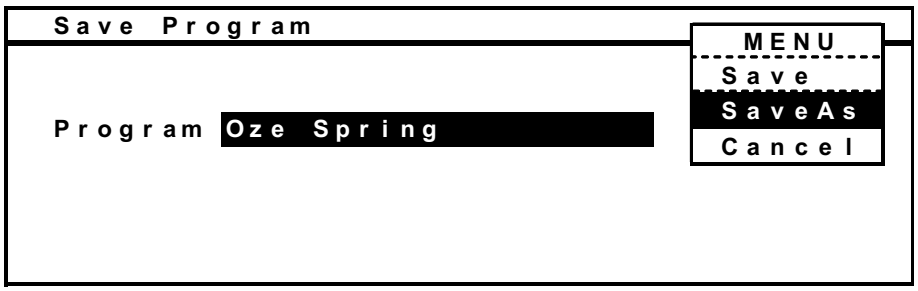
2. The saved programs are shown. Select a program (for example : Oze) to edit, and press the menu button (MENU). The menu window is opened. Select “OK”, and press the enter key (ENTER).



3. The program “Oze” is displayed. After changing the setting, press the menu button (MENU) to show the menu window. Select “Save”, and press the enter key (ENTER).

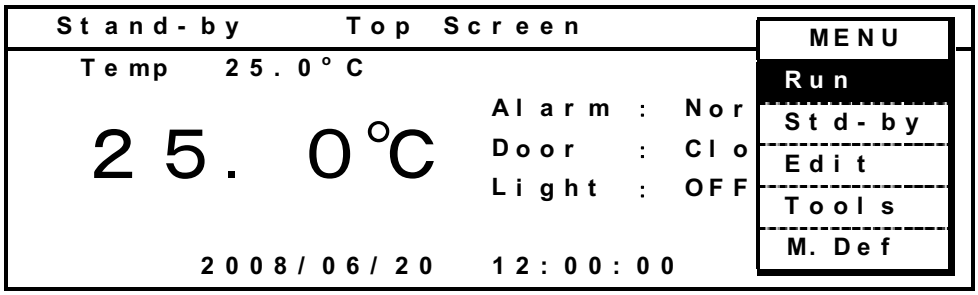


4. Save Program screen is opened. Input program name, and press the menu button (MENU) to show the menu window. Select “Save” when saving by overwriting, or select “SaveAs” when saving with another program name. Press the enter key (ENTER). The edited program is entered. Do not select “SaveAs” with same program name as another program.



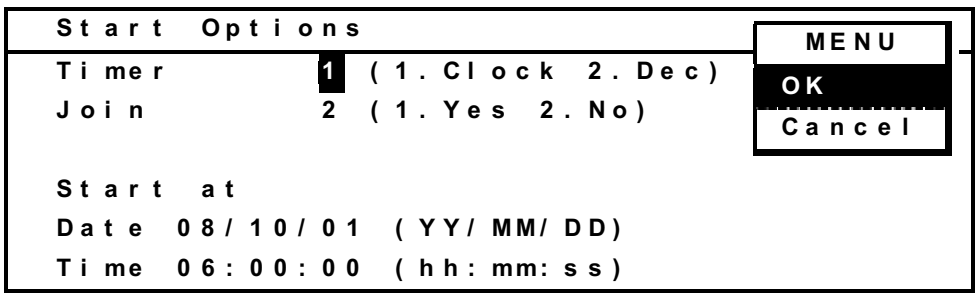
START OF PROGRAM (MENU/Run)

1. With the top screen displayed, press the menu button (MENU) to show the menu window. Select "Run", and press the enter key (ENTER).



2. Program Name Stored screen is opened. Select "Oze" and press the menu button (MENU) when starting "Oze" program. Select "OK" on the menu window, and press the enter key (ENTER).

3. Start Options screen is opened. On this screen, setting of Timer (selection of Clock mode or Timer mode), Join (Joining some programs), and start date is available. As the "Oze" is for clock mode, select 1 (Clock) for Timer. For join, select 2 (No : not join) since the Oze does not have joined program. Input the start date (Ex.2008 10 01) and time (Ex.06:00:00), and press the menu button (MENU) to show the menu window. Select "OK", and press the enter key (ENTER).



■ Timer (selection of Clock mode or Timer mode)

1. Clock (Clock mode): Displays start time of each steps.
2. Dec (Timer mode): Displays the remaining time up to a next step.

■ Join (Joining some programs)

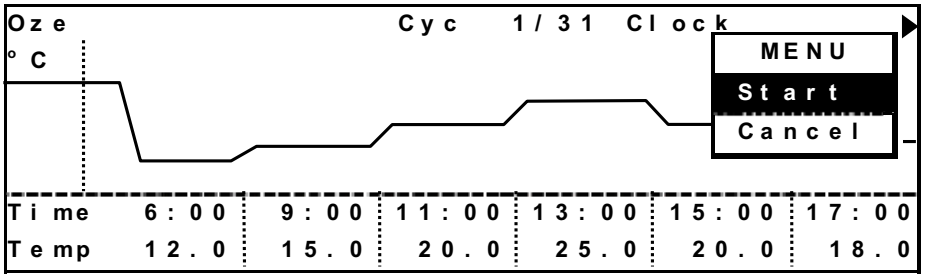
Join 1.Yes: The joined programs are operated when a selected program is set as a join program. Refer to page 28 for details.

■ Start at (desired start date)

First, date and time when the window is opened is displayed. Input the desired start date and time.

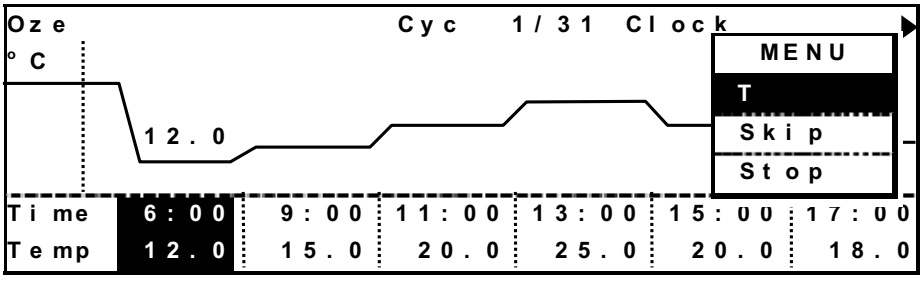
START OF PROGRAM (MENU/Run)

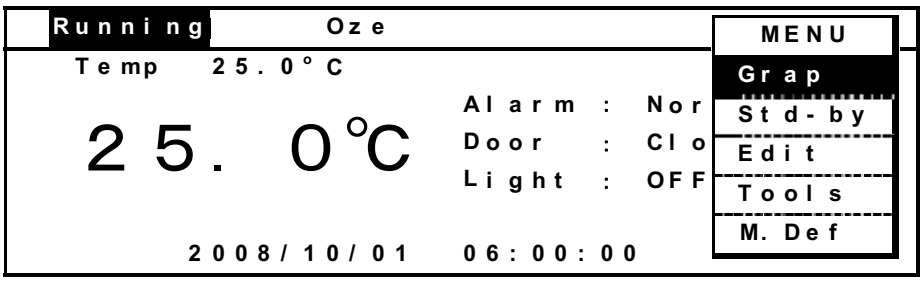
4. The selected program is displayed. Check the program and press the menu button (MENU) to show the menu window. Select “Start”, and press the enter key (ENTER).



5. The program is started at desired date and time. During the programmed running, the graphic screen as below is displayed. To change the graphic screen to the top screen, press the menu button (MENU) to show the menu window. Select “Top” and press the enter key (ENTER). To change to the graphic screen, press the menu button (MENU) to show the menu window. Select “Graph” and press the enter key (ENTER).

When the starting time of program operation is later, “Waiting” is displayed in the current running status of LCD panel.





JOIN FUNCTION

This product has join function to run several programs continuously. The maximum programs to be joined are 9. The setting of join function is as follows:

1. When joining three programs Spring, Summer and Autumn, input the same character string, # and one digit figure (joined order) before the each program name. Each program operates as a special program for join function. Any character or figure is permitted for a string on the top. The programs cannot be joined when the character string is not same.
Note: The characters after one digit figure have no effect on the join function.

Ex.1: When joining the programs Spring, Summer and Autumn in this order and top character string is "Oze" the input for the join function is as follows:
Oze#1 Spring Oze#2 Summer Oze#3 Autumn

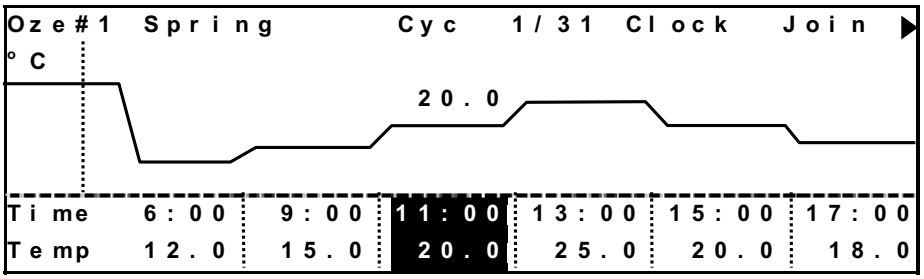
Ex.2: When joining in the order of Autumn, Spring and Summer in this order and input "NIKKO" as the same character string, the input for the join function is as follows:
NIKKO#1 Autumn NIKKO#2 Spring NIKKO#3 Summer

2. When running the joined program in Ex.1, select the program Oze#1 Spring on the Program Name Stored screen in MENU/Run (Refer to page 26).
Note: The program Oze#2 Summer is selected, the program Oze#2 Summer and Oze#3 Autumn are performed. Oze#1 Spring is not joined.

3. Select 1.Yes for the join function on the Start Options screen. Press the menu button (MENU) to show the menu window. Select "OK" and press the enter key (ENTER).
Note: The joined function is not effective if select 2. No on the Start Options screen.

4. Press the menu button (MENU) to show the menu window. Select "Start" and press the enter key (ENTER). The joined program is started.

5. Running result
Run in the order of Oze#1 → Oze#2 → Oze#3. During the running of joined program, "Join" is displayed at the upper right on the screen.

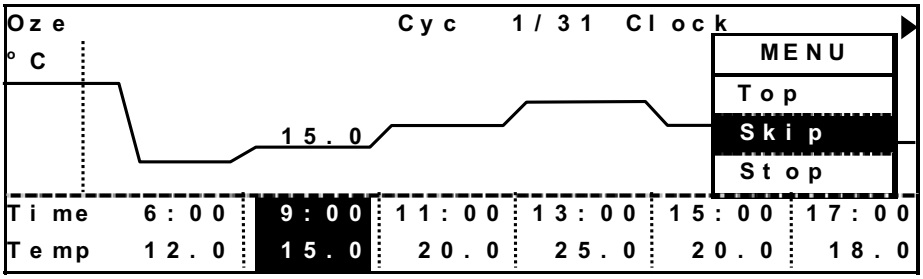


SKIP OF STEP (MENU/Skip)

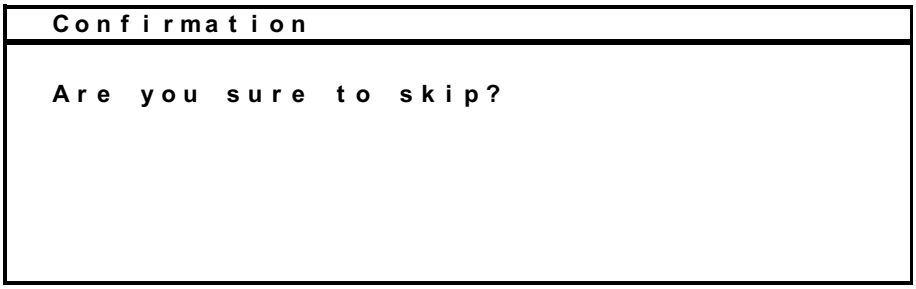
During the programmed running, the skip function is effective to skip a current step in the program.

1. Press the menu button (MENU) to show the menu window and select “Graph” when the top screen is displayed. Then press the enter key (ENTER).

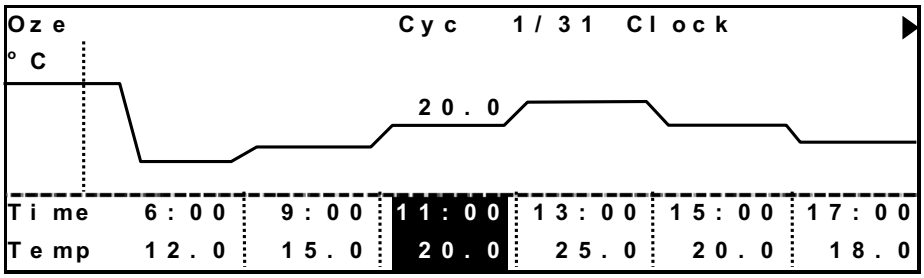
2. Press the menu button (MENU) under program running and the menu window is opened. Select “Skip”, and press the enter key (ENTER).



3. The Confirmation screen is displayed. Press the menu button (MENU). Selecting “Next” causes the skip to the next step. Selecting “Back” causes the skip to the previous step. After selecting “Next” or “Back”, press the enter key (ENTER).



4. Programmed running shifts to next step and programmed running continues.

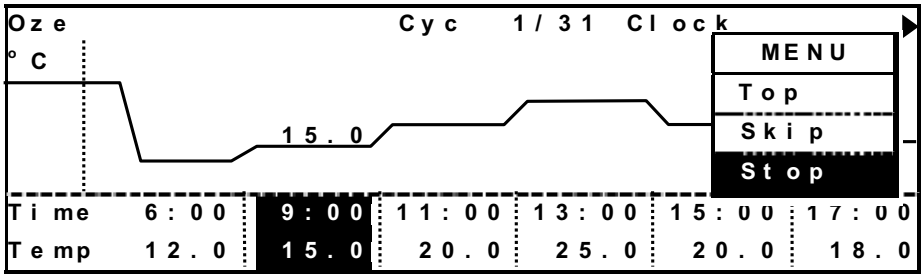


STOP OF PROGRAM (MENU/Stop)

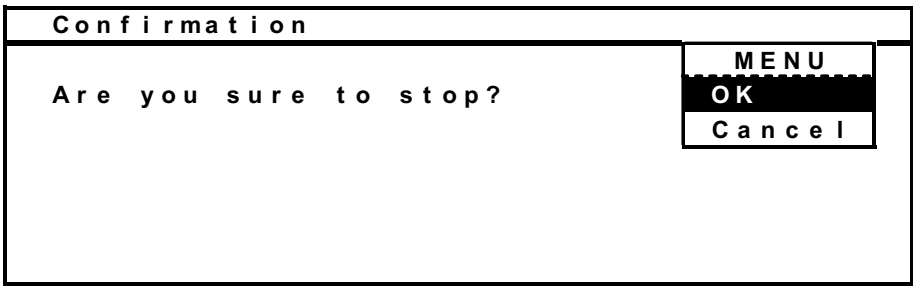
During the programmed running, it is possible to stop the running at any step.

1. During the programmed running, press the menu button (MENU) to show the menu window and select “Graph” when the top screen is displayed. Then press the enter key (ENTER).

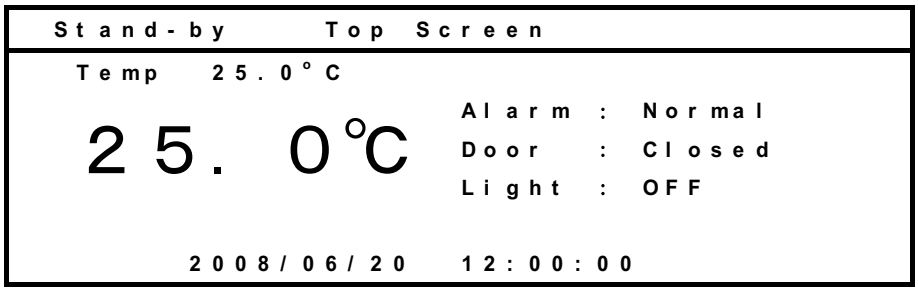
2. Press the menu button (MENU) under program running and the menu window is opened. Select “Stop”, and press the enter key (ENTER).



3. The Confirmation screen is displayed. Press the menu button (MENU). Selecting “OK” and press the enter key (ENTER) to stop the program.



4. After stopping the program, the top screen is displayed.

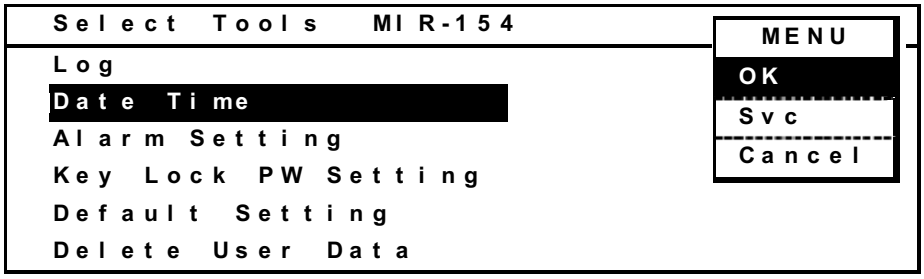


AUTOMATIC DEFROST (MENU/Tools/Date Time)

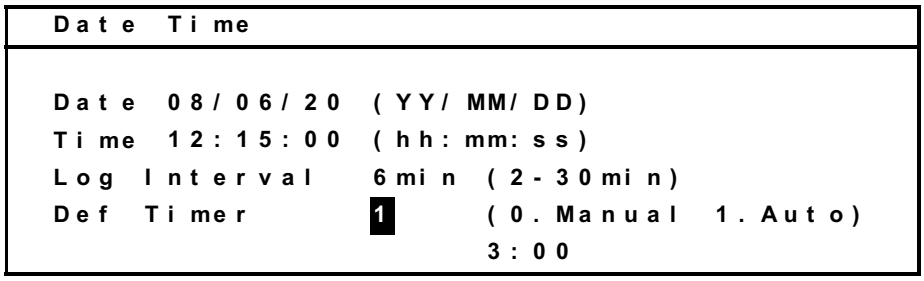
This product has a frost check opening to check amount of the frost on the evaporator that lowers temperature in a chamber. Automatic defrost function defrosts the frost on the evaporators automatically at the specified time everyday. Default setting is 1(Auto).

1. Press the menu button (MENU) to show the menu window and select “Tools” when the top screen is displayed. Then press the enter key (ENTER).

2. Select “Date Time” on the Select Tools screen, and press the menu button (MENU) to show the menu window. Select “OK” and press the enter key (ENTER).



3. The Date Time screen is displayed. Select the Def Timer (Automatic defrost function) 0 (Manual) or 1 (Auto). When selecting 0 (Manual), automatic defrosting is not done. When selecting 1 (Auto), it is possible to set the time to defrost automatically in every one hour between 0:00 and 23:00.



⚠ CAUTION

Automatic defrosting is activated even in programmed running, and the chamber temperature may arise due to the amount of the frost existing on the evaporator. In this case, manual defrosting is recommended.

⚠ CAUTION

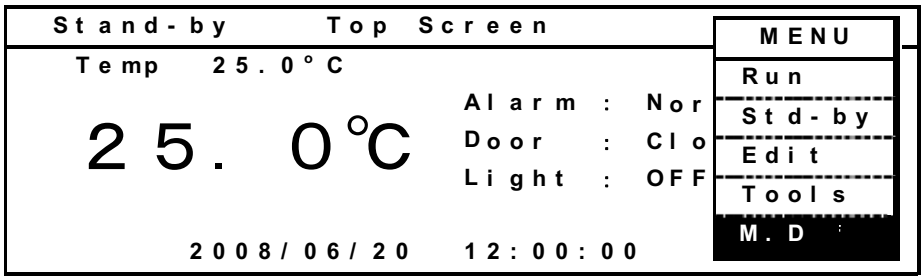
During defrosting, “Defrosting” is displayed on running status of LCD panel.
Care should be taken for deviation of setting and current temperature during defrosting. Especially in case of long term programmed running of setting temperature below 5℃, expected running will be failed due to frost. Defrosted water will be evaporated automatically outside of the chamber.

- Defrosting is likely not to operate when the inner temperature is over 5℃.
- Frost will exist on the evaporator when temperature setting is below 5℃. Frost-clogged evaporator causes insufficient cooling and inner temperature rising. When a lot of frost existed on the evaporator is seen through the frost check opening, immediate defrosting is required. Frosting on the evaporator is accelerated when moisturized material is put inside the chamber.

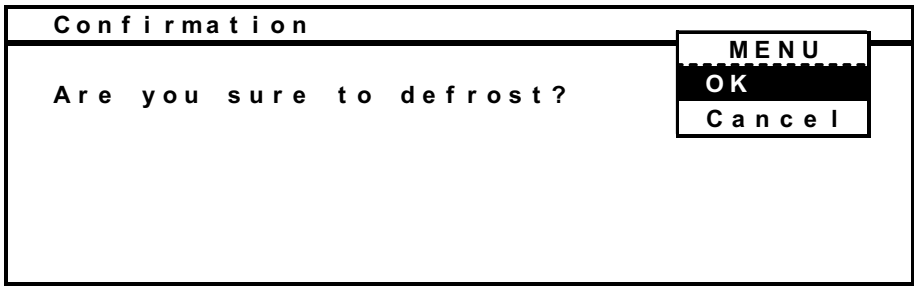
MANUAL DEFROST (MENU/M.def)

The manual defrost function is for defrosting the frost on the evaporator at any time. When a lot of frost on the main evaporator is found, start the manual defrost. Besides this function, it is possible to set the automatic defrost function. (refer to page 31)

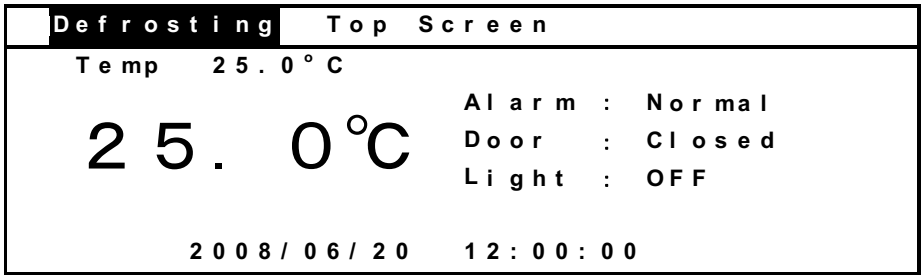
1. Press the menu button (MENU) to show the menu window. Select “M.Def” and press the enter key (ENTER).



2. The Confirmation screen is displayed.



3. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER). The manual defrost is started. During defrosting, “Defrosting” is displayed at the upper left on the top screen.



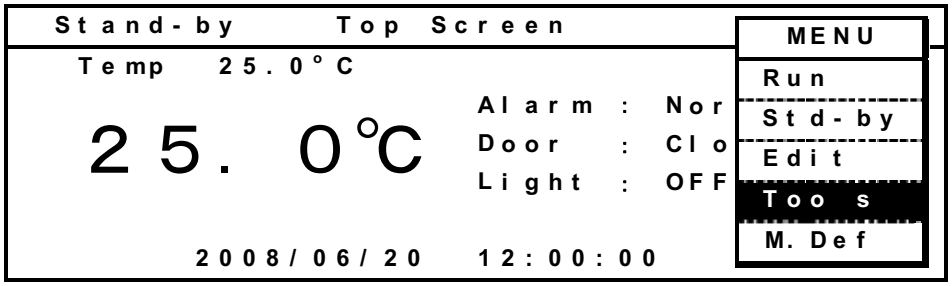
> ⚠ **CAUTION**
> The manual defrost can be started during programmed running, standby operation, or automatic defrosting.

4. The manual defrost is finished automatically. The defrosting time depends on the amount of frost on the evaporator.

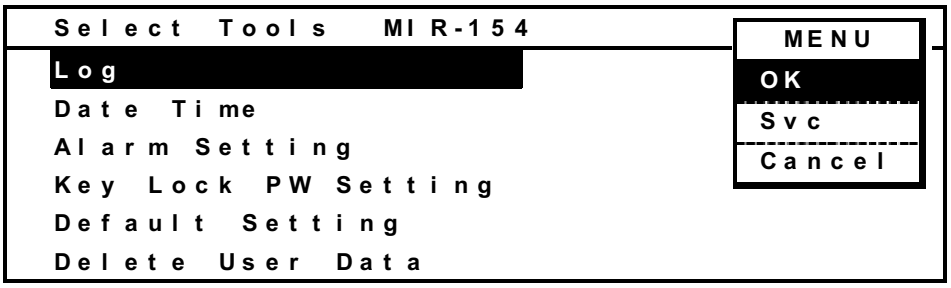
VARIOUS SETTING (MENU/Tools)

The log can be displayed and various setting can be changed by using “Tools” menu.

1. Press the menu button (MENU) with the top screen to show the menu window. Select “Tools, and press the enter key (ENTER).

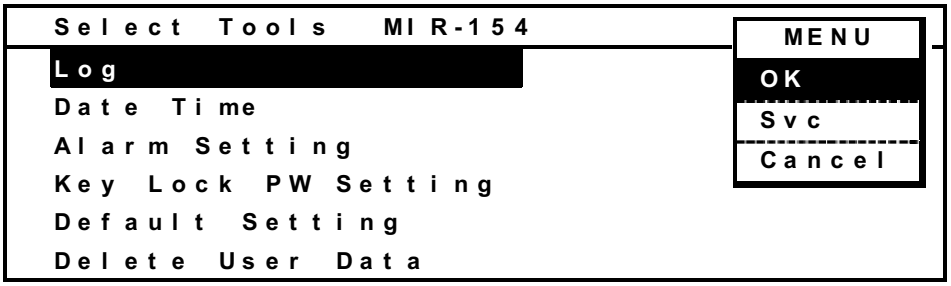


2. The Select Tools screen is as follows.

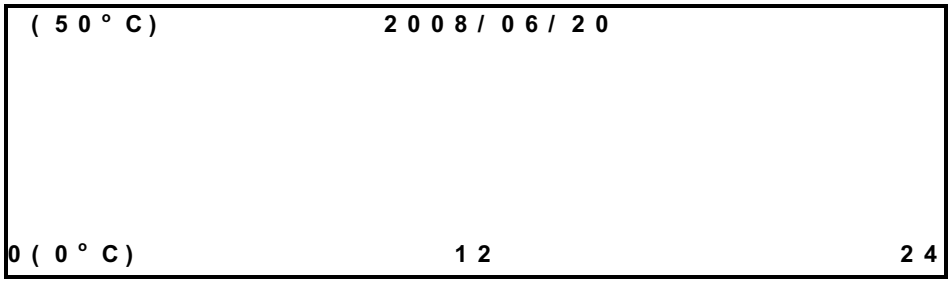


Display of log (Tools/Log)

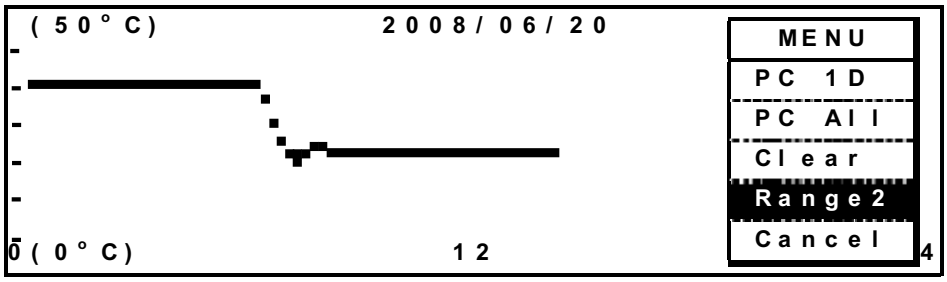
1. Select “Log” in the Select Tools screen. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER).

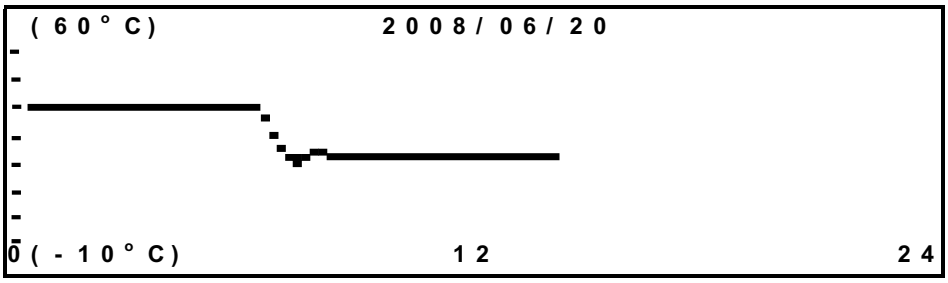


2. The log is presented with dot. By pressing the upward shift key or downward shift key, the log to be displayed is changed; temperature and light step. The displayed date is scrolled by pressing the leftward or rightward shift key. (leftward shift key; older date, rightward shift key; newer date.)

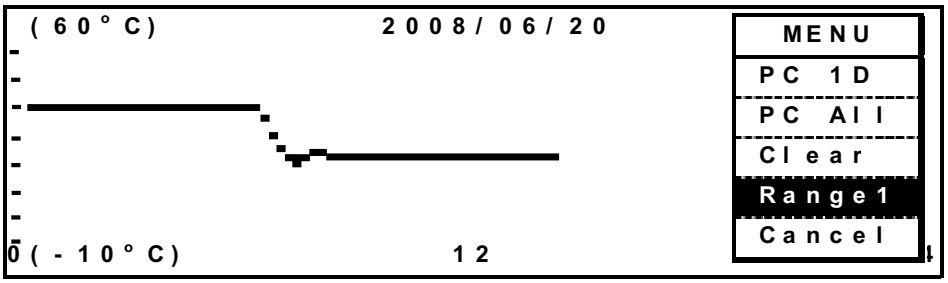


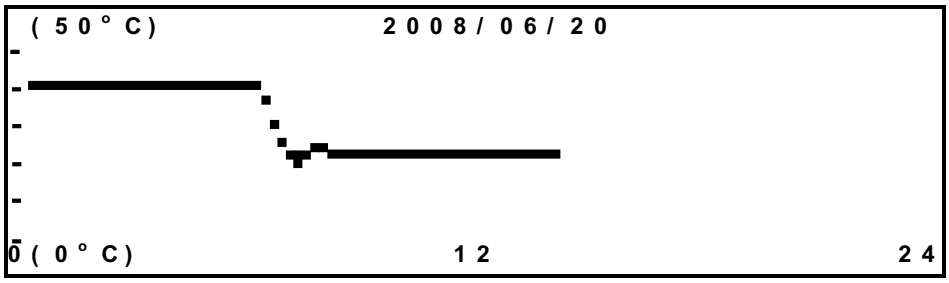
3. The display area (upper and lower limit) can be changed. Press the menu button (MENU) to show the menu window. Select “Range2” and press the enter key (ENTER). Upper limit is changed from 50 °C to 60 °C and lower limit is changed from 0 °C to -10 °C.





Similarly, select “Range1” and press the enter key (ENTER). Upper limit is changed from 60 °C to 50 °C and lower limit is changed from -10 °C to 0 °C.

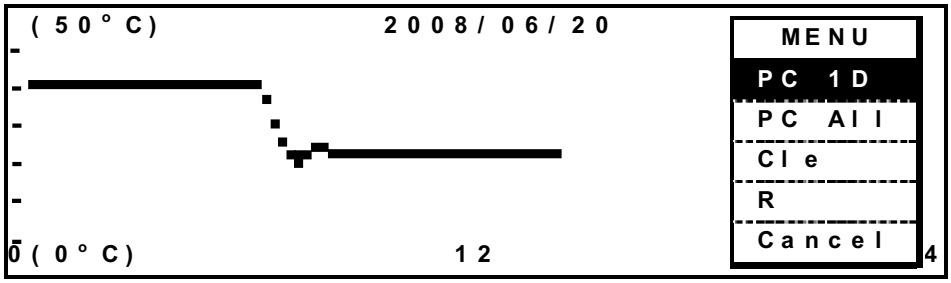




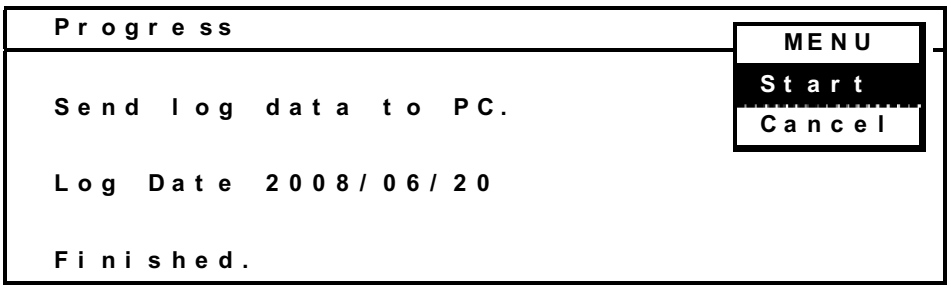
Data transmission

The procedure to transmit the log data to a PC is as follows.

1. Press the menu button (MENU) to show the menu window. Select “PC 1D”, and press the enter key (ENTER) when the log for one day is necessary. Select “PC All”, and press the enter key (ENTER) when all data recorded is necessary.



2. The Progress screen is displayed. Specify a transfer, capture of text and retention file name by operation of hyper terminal on PC. Apply “txt” or “csy” to retention file as an extension. Press the menu button (MENU) to show the menu window. Select “Start”, and press the enter key (ENTER).
The transmission is started. “Finished” display means the end of transmission.



Setting in PC side for transmission of log data (For Windows 2000 and Windows XP)

1. From start button, start the hyper terminal (start button → program → accessory → communication -hyper terminal).
(when not registered in the start menu, C:¥Program Files¥Windows NT¥hypertrm.exe）

2. Through the hyper terminal display, set new connection, name (for example: Sanyo), setting of connection, method of connection, COM1, property of COM1 and port.
bit/sec; 9600, data bit; 8, parity; no, stop bit; 1, flow control; Xon/Xoff.
(Communicating condition of MIR side is set as above automatically when the Progress screen is displayed.)

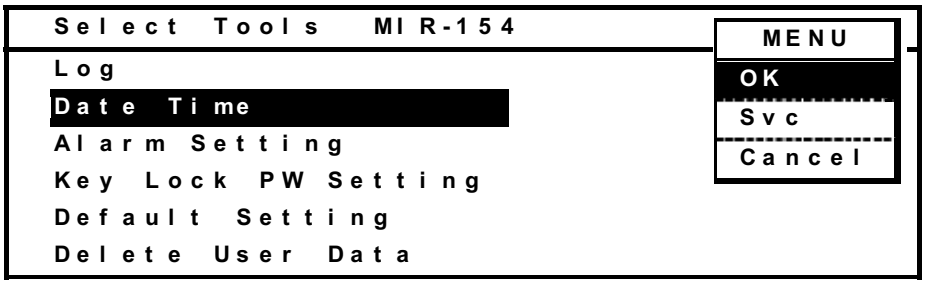
Note:

For the data transmission, an optional communication terminal MTR-480C is necessary.

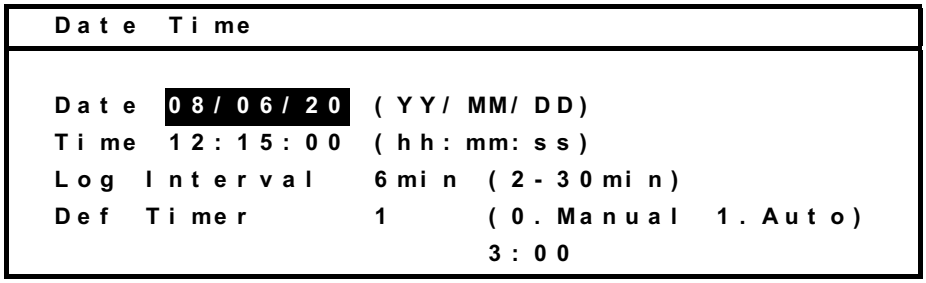
VARIOUS SETTING (MENU/Tools)

Setting of date, time, log (Tools/Date Time)

1. Select “Date Time” in the Select Tools screen. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER).



2. The Date Time screen is displayed. Set date, time or log cycle.



■ Date input (Ex: June 20, 2008)
Input 080620 in the date cell.

■ Time input (Ex: 12:15:00)
Input 121500 in the time cell.

■ Log cycle input (Ex: 6 minutes)
Input 6 in log Interval cell.

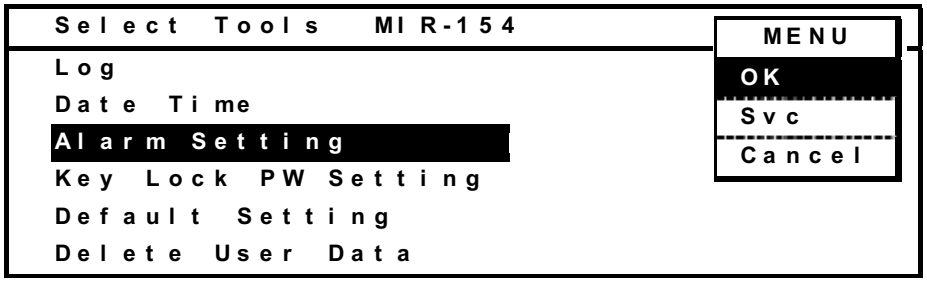
Note:
■ The default is 6 minutes.
■ The acceptable range is between 2 and 30 minutes.
■ Relation between the log interval and spans that can be memorized
1: Log interval 2 min About 5 days
2: Log interval 6 min About 14 days
3: Log interval 30 min About 70 days
After passing the memory limit, the older data is deleted and newer data is memorized.

■ Setting of automatic defrost
Select one of two defrosting patterns. The default is 1. For the details of automatic defrost, refer to page 31.
0: Manual defrost
1: Automatic defrost

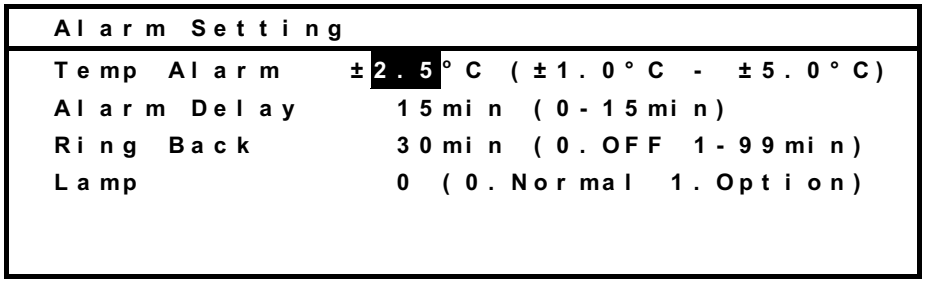
VARIOUS SETTING (MENU/Tools)

Alarm setting (Tools/Alarm Setting)

1. Select “Alarm Setting” in the Select Tools screen. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER).



2. The Alarm Setting screen is displayed. On this screen, the temperature alarm (Temp Alarm), delay time of alarm (Alarm Delay), alarm resume time (Ring Back) and lamp (Lamp) can be set. The alarm buzzer is silenced by pressing the alarm buzzer stop key (BUZZER) during alarm condition. The buzzer will be activated again after certain suspension if the alarm condition continues. The suspension time (ring back) can be set.



The settable range:

- Temperature alarm (Temp Alarm): ±1.0～±5.0°C.
- Delay time of alarm（Alarm Delay）: 0～15 minutes.
- Suspension time (Ring Back): 1～99 minutes, or OFF

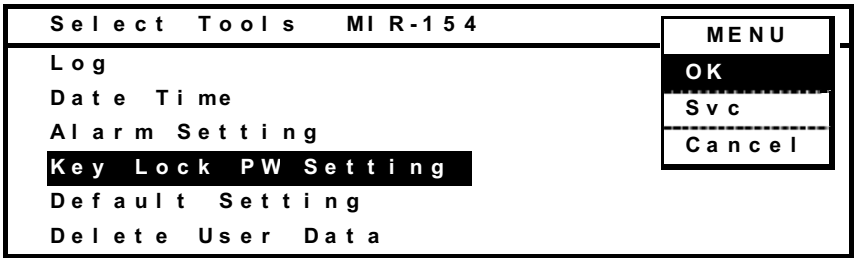
3. When light add-on kit (sold separately) is installed, set the lamp (Lamp) to 1.

・When light add-on kit (sold separately) is installed, except when the set value of temperature is between +20～+50°C, the lighting is turned off.

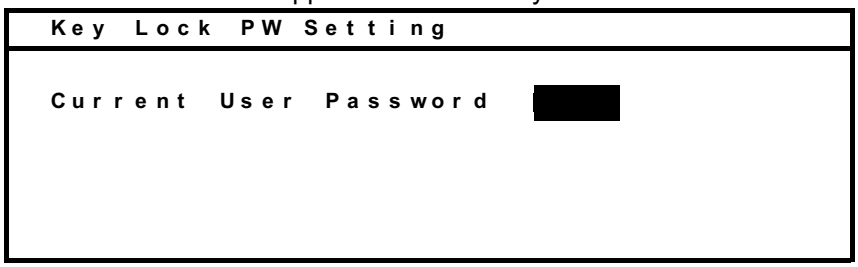
> ⚠ **CAUTION**
>
> It is not possible to change the delay time of door alarm, 2 minutes only. When door is open, “Open” is displayed on the top screen.

Key lock password setting (Tools/Key Lock PW Setting)

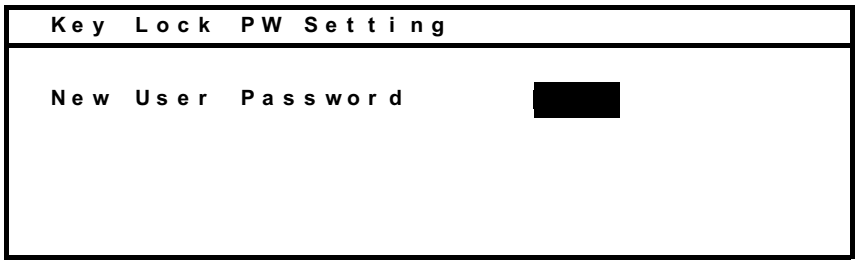
1. Select “Key Lock PW Setting” in the Select Tools screen. Press the menu button (MENU) to show the menu window. Select “OK” and press the enter key (ENTER).



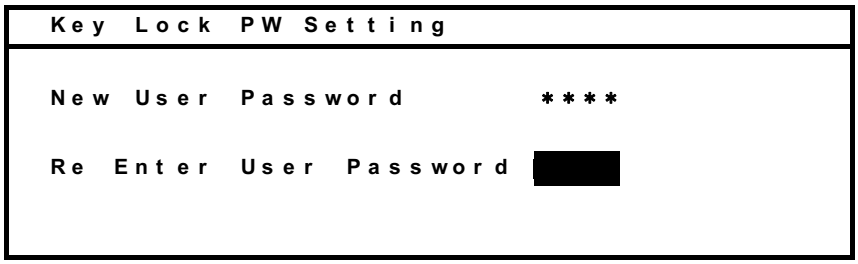
2. Input the Current User Password (4 digits). Select “OK” and press the enter key (ENTER).
The default User Password when shipped from the factory is “0000”.



3. Input New User Password (4 digits). Select “OK” and press the enter key (ENTER).



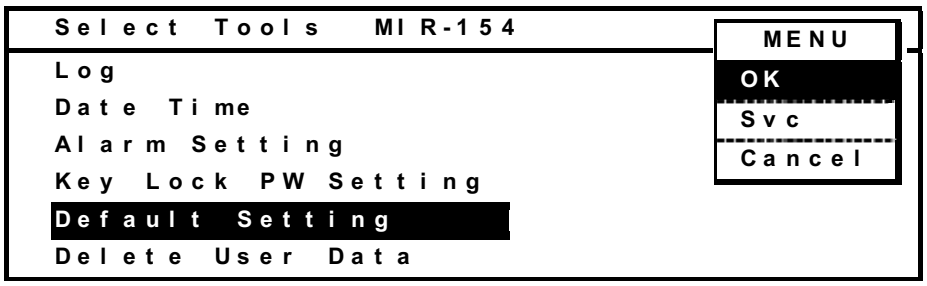
4. Input User Password (4 digits) again. Select “OK” and press the enter key (ENTER).



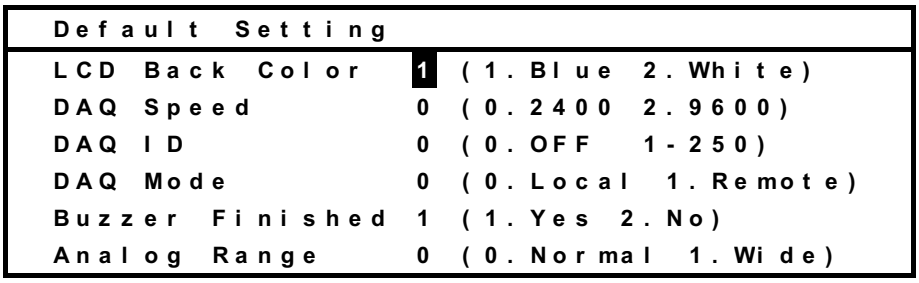
VARIOUS SETTING (MENU/Tools)

Default setting (Tools/Default Setting)

1. Select “Default Setting” in the Select Tools screen. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER).



2. The Default Setting screen is displayed. Set the default for each parameter as necessary.

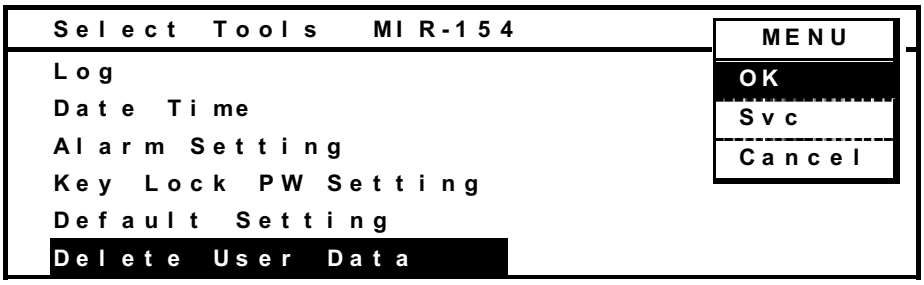

Default Setting
LCD Back Color 1 (1.Blue 2.White)
DAQ Speed 0 (0.2400 2.9600)
DAQ ID 0 (0.OFF 1-250)
DAQ Mode 0 (0.Local 1.Remote)
Buzzer Finished 1 (1.Yes 2.No)
Analog Range 0 (0.Normal 1.Wide)

LCD Back Color: Setting of background color (1. Blue 2. White)
Buzzer Finished: Select of buzzer activation (1: Yes) or no activation (2: No) at the time of completion of a programmed running. (The buzzer activates 6 times when a program is finished.)
Analog Range: Select of analog output range of temperature in chamber (0: 0～50°C 1: -20～80°C)

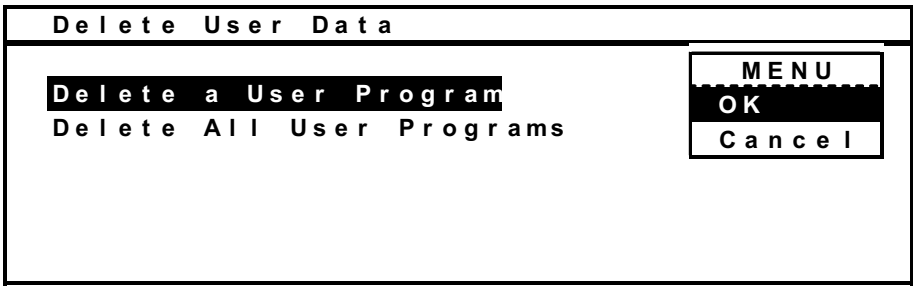
Note:
DAQ is an external monitoring system of chamber status. It is necessary to set the DAQ Speed, DAQ ID and DAQ Mode when using communication software. Communication software is ordered specially contact Sanyo sales representative or agent.

Delete of program (Tools/Delete User Data)

1. Select “Delete User Data” in the Select Tools screen. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER).



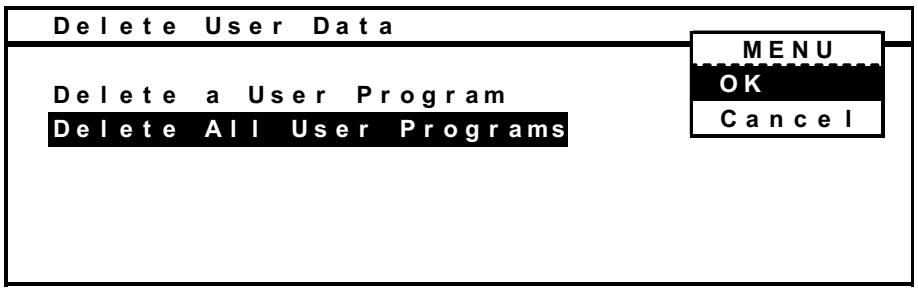
2. The Delete User Data screen is displayed. To select a program to deleted, select “Delete a User Program” and press the menu button (MENU) to show the menu window. Select “OK” and press the enter key (ENTER).



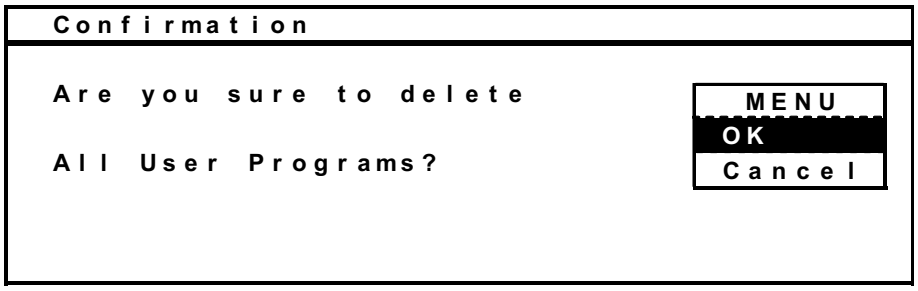
3. A list of saved programs is displayed. Select a program (Ex: Oze#1 Spring) to delete, press the menu button (MENU) to show the menu window. Select “Delete” and press the enter key (ENTER).

4. The Confirmation screen is displayed. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER). The program (Oze#1 Spring) is now deleted.

5. To deleting all programs, select “Delete All User Programs” in Delete User Data screen and press the menu button (MENU) to show the menu window. Select “OK” and press the enter key (ENTER).

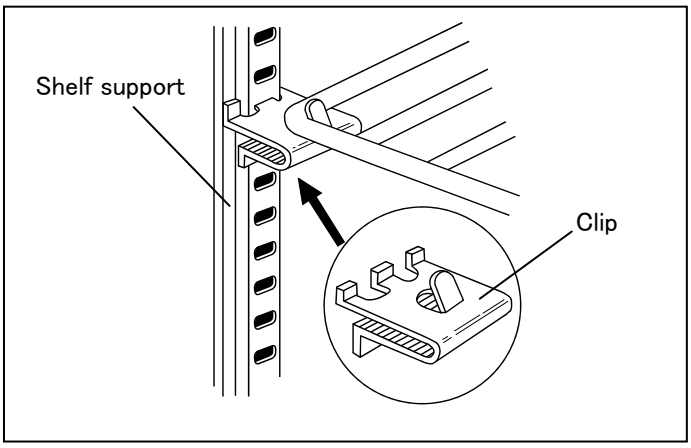


6. The Confirmation screen is displayed. Press the menu button (MENU) to show the menu window. Select “OK”, and press the enter key (ENTER). All of the programs are now deleted.



ADJUSTMENT OF SHELVES

The interval between the shelves can be adjusted depending on the height of the stored items. To install the shelves, insert the clip to the desired location.



Note:

● The chamber is refrigerated by the forced circulation of cooled air inside the chamber. Ensure that the intake and exhaust vents are not blocked. Adequate space should be provided between the items inside the unit to allow air circulation. And always install the stainless plate on the bottom shelf. The operation without this plate makes the temperature distribution worse.

● Do not store any materials that can generate the corrosive gas such as sulfureted gas or gaseous chlorine in the chamber. The corrosive gas may cause failure of the products.

ALARMS AND SAFETY FUNCTIONS

The unit has the alarms and safety function as shown in the table 1 below.

Table 1　Alarms and safety functions

	Alarm	Condition	Display	Buzzer	Remote contact	Safety operation
1	Auto-set temp. alarm	When the chamber temp. deviates from set temp. by more than 2.5°C.（±1.0～5.0 °C changeable）	<Top screen> The current chamber temp. blinks.	Intermittent tone with delay	Alarm status with delay	High stage side; heater OFF Low stage side; compressor OFF
2	Upper limit alarm	When the chamber temp. is higher than the upper limit temp.	———	Continuous tone	Alarm status	Heater, fluorescent lamp, fan motor OFF
3	Lower limit alarm	When the chamber temp. is lower than the lower limit temp.	———	Continuous tone	Alarm status	Compressor OFF
4	Thermal fuse	When the chamber temp. is over 70°C	———	——	—	Main heater and sub-heater OFF
5	Thermal sensor abnormality	Input voltage is over 70°C corresponding Input voltage is lower than -25°C corresponding	<Top screen> "E01:Temp. sensor is opened." "E02:Temp. sensor is shorted."	Intermittent tone	Alarm status	Heater, fluorescent lamp, fan motor and compressor OFF
6	Abnormal completion of defrosting	The temp. control sensor is higher than 20°C during defrosting	<Top screen> "E03:Abnormal completion of defrosting."	——	—	Forced finish of defrosting
7	Short-circuit of SSR or compressor relay	Microcomputer determines triac/compressor relay is shorted	<Top screen> "E04:SSR or comp. relay is shorted."	Intermittent tone	Alarm status	——
8	Disconnection of SSR	The heater is not energized	<Top screen> "E05:SSR is open-circuited."	Intermittent tone	Alarm status	——
9	Disconnection of compressor relay	The compressor relay is not energized	<Top screen> "E06:Comp. relay is open-circuited."	Intermittent tone	Alarm status	——

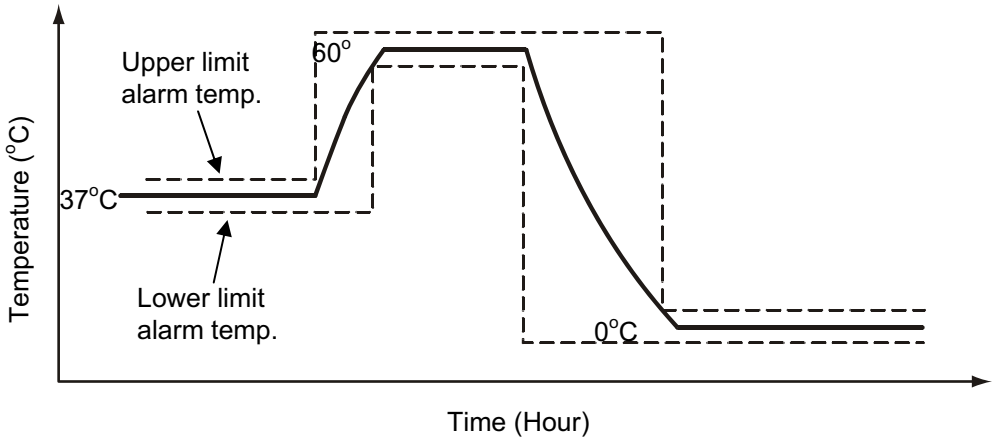
ALARMS AND SAFETY FUNCTIONS

	Alarm	Condition	Display	Buzzer	Remote contact	Safety operation
10	Buzzer delay	Under condition of item 1 (delay time; changeable)	———	——	—	——
11	Back-up of program	During power failure	———	——	—	Nonvolatile memory Continuous running after recovery from power failure
12	Back-up of clock function	During power failure	———	——	—	Continuous running by battery (CR2032)
13	Fan lock	Fan is locked	<Top screen> "E07:Air circulating fan motor trouble."	Intermittent tone	Alarm status	Compressor OFF and heater OFF
14	Protection of compressor	The protective sensor is higher than 80°C(154) or 85°C (254)	<Top screen> "E08:Comp. is over-heat."	Intermittent tone	Alarm status	——
15	Time to replace the fan	The running time is over 75,000 hours	<Top screen> "Warning:Replace air circulating fan mot."	——	—	——

ALARMS AND SAFETY FUNCTIONS

16	Disconnection of compressor protective sensor	The input voltage corresponds to -50°C or less Disconnection of sensor	<Top screen> "E09:Comp.sensor is opened."	Intermittent tone	Alarm status	Compressor OFF
17	Defrost sensor abnormality	The input voltage corresponds to -50°C or less Disconnection of sensor	<Top screen> "E10:Def.sensor is opened."	Intermittent tone	Alarm status	Heater OFF
		The input voltage corresponds to 70°C or more Short of sensor	<Top screen> "E11:Def.sensor is shorted."	Intermittent tone	Alarm status	Heater OFF
18	Time to replace the fan motor for compressor	The running time is over 42,000 hours	<Top screen> "Warning:Replace comp. cooling fan motor"	——	—	——
19	Door alarm	Door is open for 2 minutes.	<Top screen> "Door:Open"	Intermittent tone with delay	—	Heaters, fan motor OFF

The auto-set temperature alarm function is fitted in the temperature controller. The alarm is activated automatically when the chamber temperature deviates ±2.5°C（±1.0～±5.0°C） from the set temperature. This temperature alarm function is set automatically even if under the program operation. The alarm is activated as follows under program operation.



＊The buzzer is stopped by pressing the alarm buzzer stop key (BUZZER), but the remote alarm keeps alarm status. The buzzer resulting from upper limit alarm cannot be silenced by the alarm buzzer stop key (BUZZER).

＊The alarm may be activated when the setting of auto-set temperature alarm is small range.

MAINTENANCE

⚠WARNING

Always disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Cleaning

• Clean the unit once a month. Regular cleaning keeps the unit looking new.

• Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the unit and all accessories. If some of them are dirty, use a cloth containing diluted neutral dishwashing detergent (Undiluted detergent may break the plastic parts. For the dilution, follow the instruction enclosed with the detergent). When a diluted neutral dishwashing detergent is used, wipe the cabinet or accessories thoroughly with a cloth soaked in clean water. Then wipe the cabinet or accessories unit with a dry cloth to eliminate the moisture.

• Never pour water onto or into the unit. Doing so can damage the electrical insulation and may cause electric shock or short circuit.

• The compressor and other mechanical part are completely sealed. This unit requires absolutely no lubrication.

• Wipe off the condensation on the outside frame or glass with a soft dry cloth.

⚠CAUTION

Do not use brushes, acids, thinners, powdered soap or hot water for cleaning the freezer. Polishing powders or hot water can deteriorate the painted surfaces or cause deformation, discoloration or degeneration of plastic or rubber components. Be especially careful not to wipe plastic or rubber parts with volatile solvents such as benzine.

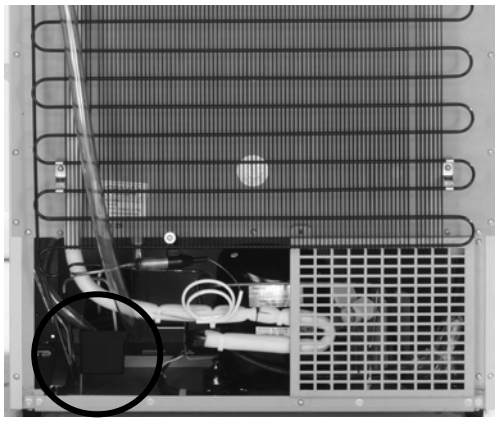
Cleaning of evaporating tray

The evaporating tray is located at lower left side on the back. Clean the evaporating tray twice or three times per year with water. Before removing the evaporating tray, wipe off the water in it. The procedure to remove is as follows:

1. Lift the evaporating tray and separate from the fixing plate.

2. Tilt the evaporating tray and pull out to avoid the damage to the evaporating pipe.

To replace the evaporating tray, follow the procedure in reverse.

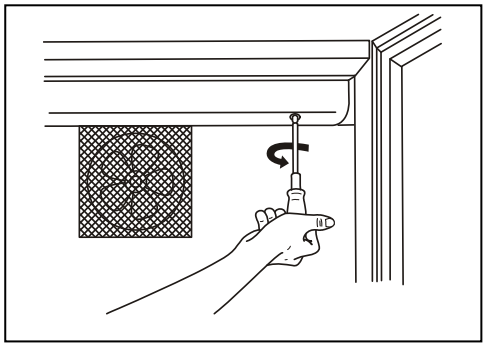


MAINTENANCE

Replacement of lamp

Turn off the power switch and disconnect the power supply plug from the outlet.

1. Remove 2 screws fixing the shade by using a screw driver as shown in the figure.



2. Pull the lamp downward with lead wire connected.

3. After removing the water-proof rubber on the both sides, remove the socket from the lamp.

4. Attach the socket to a new lamp and then replace the water-proof rubber.

5. Replace the shade and fix with 2 screws.

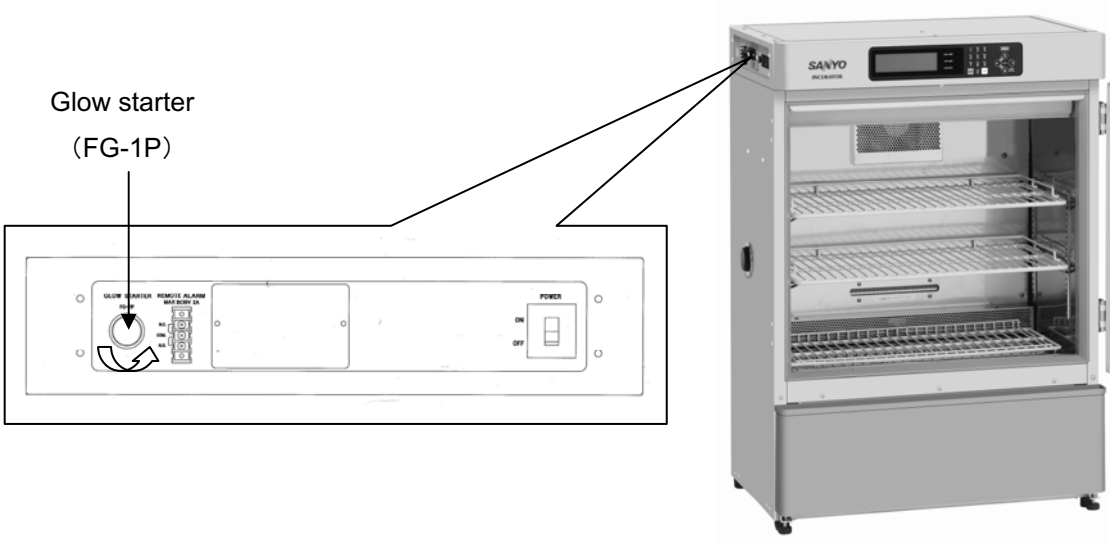
Replacement of glow starter

The glow starter is located at the switch box on the upper left side.

1. Turn off the power switch and disconnect the power supply plug from the outlet.

2. Turn the glow starter to counter clockwise to remove. (see figure below)

3. Set a new glow starter. (type: FG-1P)



TROUBLESHOOTING

If the unit malfunctions, check out the following before calling for service. In the case of no refrigeration or poor refrigeration, transfer the stored items to another refrigerator or freezer before checking out.

Malfunction	Check/Remedy
When the buzzer sounds continuously	In the event of lower limit temperature alarm ▪ The set temperature of the chamber is lower than the lower limit temperature. The lower limit temperature should be lower than the set temperature by more than 5°C. In the event of upper limit temperature alarm ▪ The set temperature of the chamber is higher than the upper limit temperature. The upper limit temperature should be higher than the set temperature by more than 5°C. ▪ The excessive heat source is in the chamber. Remove the excessive heat source. For the allowable heat load, refer to the graphs on page 53.
When the program operation does not function well	The chamber temperature does not change according to the program. ▪ The incubator performance (pull-up, pull-down) is not sufficient for the program setting. ▪ The over-heat or over-cool alarm temperature is wrong. These temperatures should be set 5°C higher and lower than the upper and lower limits of the temperature controller respectively. Once excessively high/low temperature limits have been determined, the operation temperatures cannot be changed significantly due to the existence of the limits for extremes of temperature. For this reason, the excessively high/low temperature limits should be set at a wide range when the program operation is set.

Note:
If the malfunction is not eliminated after checking the above items, or the malfunction is not shown in the above table, contact Sanyo sales representative or agent.

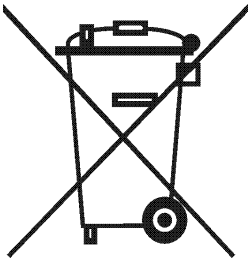
DISPOSAL OF UNIT

⚠WARNING
If the unit is to be stored unused in an unsupervised area for an extended period **ensure that children do not have access and doors cannot be closed completely.**
The disposal of the unit should be accomplished by appropriate personnel. Always remove doors to prevent accidents such as suffocation.

DISPOSAL OF UNIT

Note:
This symbol mark and recycle system are applied only to EU countries and not applied to the countries in the other area of the world.

Waste Electrical and Electronic Equipment (WEEE) Directive-2002/96/EC



(English)
Your SANYO product is designed and manufactured with high quality materials and components which can be recycled and reused.

This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from your household waste.

Please dispose of this equipment at your local community waste collection/recycling centre.

In the European Union there are separate collection systems for used electrical and electronic products.

Please help us to conserve the environment we live in!

(German)
Ihr SANYO Produkt wurde entworfen und hergestellt mit qualitativ hochwertigen Materialien und Komponenten, die recycelt und wiederverwendet werden können.

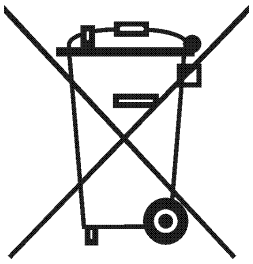
Dieses Symbol bedeutet, daß elektrische und elektronische Geräte am Ende ihrer Nutzungsdauer von Hausmüll getrennt entsorgt werden sollen.

Bitte entsorgen Sie dieses Gerät bei Ihrer örtlichen kommunalen Sammelstelle oder im Recycling Centre.

In der Europäischen Union gibt es unterschiedliche Sammelsysteme für Elektrik- und Elektronikgeräte.

Helfen Sie uns bitte, die Umwelt zu erhalten, in der wir leben!

DISPOSAL OF UNIT



(French)
Votre produit Sanyo est conçu et fabriqué avec des matèriels et des composants de qualité supérieure qui peuvent être recyclés et réutilisés.

Ce symbole signifie que les équipements électriques et électroniques en fin de vie doivent être éliminés séparément des ordures ménagères.

Nous vous prions donc de confier cet équipement à votre centre local de collecte/recyclage.
Dans l'Union Européenne, il existe des systèmes sélectifs de collecte pour les produits électriques et électroniques usagés.

Aidez-nous à conserver l'environnement dans lequel nous vivons !

Les machines ou appareils électriques et électroniques contiennent fréquemment des matières qui, si elles sont traitées ou éliminées de manière inappropriée, peuvent s'avérer potentiellement dangereuses pour la santé humaine et pour l'environnement.
Cependant, ces matières sont nécessaires au bon fonctionnement de votre appareil ou de votre machine. Pour cette raison, il vous est demandé de ne pas vous débarrasser de votre appareil ou machine usagé avec vos ordures ménagères.

(Spanish)
Los productos SANYO están diseñados y fabricados con materiales y componentes de alta calidad, que pueden ser reciclados y reutilizados.

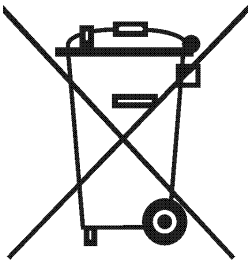
Este símbolo significa que el equipo eléctrico y electrónico, al final de su ciclo de vida, no se debe desechar con el resto de residuos domésticos.

Por favor, deposite su viejo "televisor" en el punto de recogida de residuos o contacte con su administración local.

En la Unión Europea existen sistemas de recogida específicos para residuos de aparatos eléctricos y electrónicos.

Por favor, ayúdenos a conservar el medio ambiente!

DISPOSAL OF UNIT



(Portuguese)
O seu produto SANYO foi concebido e produzido com materiais e componentes de alta qualidade que podem ser reciclados e reutilizados.

Este símbolo significa que o equipamento eléctrico e electrónico no final da sua vida útil deverá ser descartado separadamente do seu lixo doméstico.

Por favor, entregue este equipamento no seu ponto local de recolha/reciclagem.

Na União Europeia existem sistemas de recolha separados para produtos eléctricos e electrónicos usados.

Por favor, ajude-nos a conservar o ambiente em que vivemos!

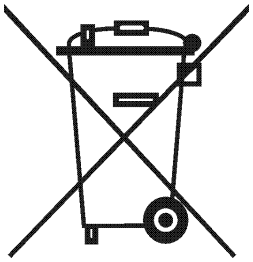
(Italian)
Il vostro prodotto SANYO è stato costruito da materiali e componenti di alta qualità, che sono riutilizzabili o riciclabili.

Prodotti elettrici ed elettronici portando questo simbolo alla fine dell'uso devono essere smaltiti separatamente dai rifiuti casalinghi.

Vi preghiamo di smaltire questo apparecchio al deposito comunale.
Nell'Unione Europea esistono sistemi di raccolta differenziata per prodotti elettrici ed elettronici.

Aiutateci a conservare l'ambiente in cui viviamo!

DISPOSAL OF UNIT



(Dutch)
Sanyo producten zijn ontwikkeld en gefabriceerd uit eerste kwaliteit materialen, de onderdelen kunnen worden gerecycled en weer worden gebruikt.

Het symbool betekent dat de elektrische en elektronische onderdelen wanneer deze vernietigd gaan worden , dit separaat gebeurt van het normale huisafval.

Zorg ervoor dat het verwijderen van de apparatuur bij de lokaal erkende instanties gaat gebeuren.
In de Europese Unie wordt de gebruikte elektrische en elektronische apparatuur bij de daarvoor wettelijke instanties aangeboden.

Alstublieft help allen mee om het milieu te beschermen.

(Swedish)
Din SANYO produkt är designad och tillverkad av material och komponenter med hög kvalitet som kan återvinnas och återanvändas.

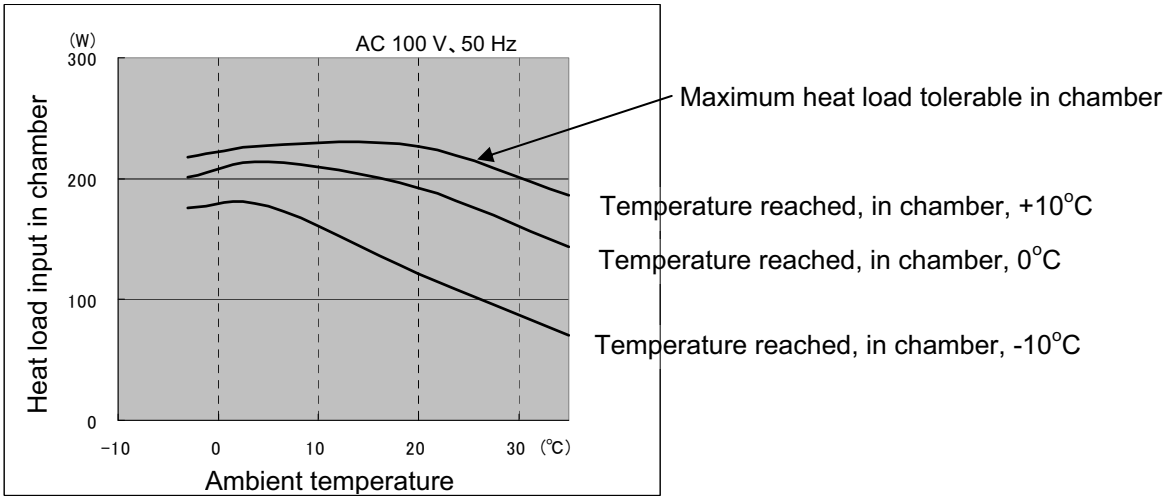
Denna symbol betyder att elektriska och elektroniska produkter, efter slutanvändande, skall sorteras och lämnas separat från Ditt hushållsavfall.

Vänligen, lämna denna produkt hos Din lokala mottagningstation för avfall/återvinningsstation.

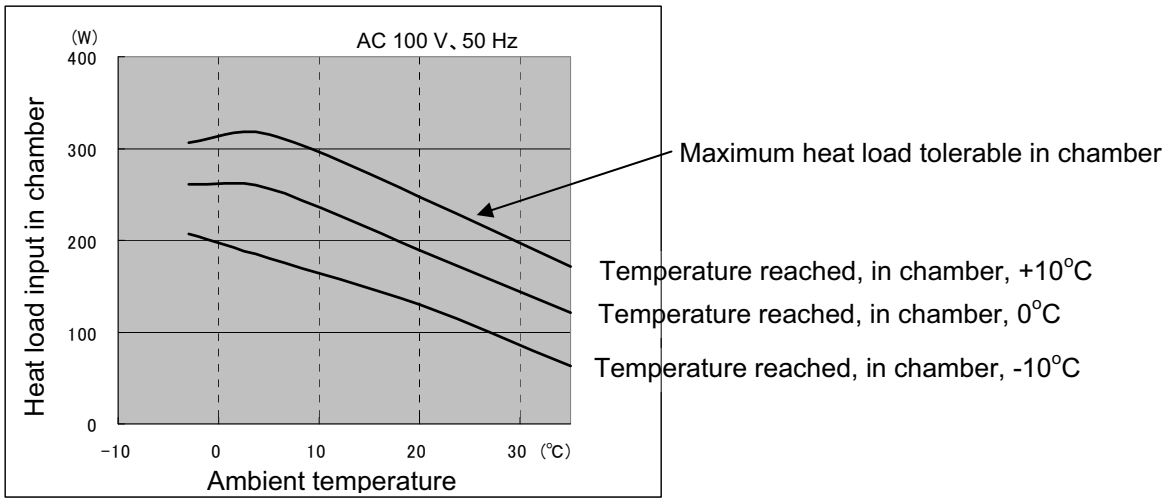
Inom den Europeiska Unionen finns det separata återvinningssystem för begagnade elektriska och elektroniska produkter.

Vänligen, hjälp oss att bevara miljön vi lever i!

PERFORMANCE DATA



Graph 1 <MIR-154>
Relation between chamber heat load and attainable chamber temperature



Graph 2 <MIR-254>
Relation between chamber heat load and attainable chamber temperature

※ The performance data is the data with the lamp OFF.
※ The performance may be varied slightly depending on each unit or running condition.

SPECIFICATIONS

Name	Cooled Incubator	
Model	MIR-154	MIR-254
External dimensions	W700 x D580 x H1018 (mm) W27.56 x D22.83 x H40.08 (inch)	W700 x D580 x H1618 (mm) W27.56 x D22.83 x H63.7 (inch)
Internal dimensions	W620 x D368 x H555 (mm) W24.41 x D14.49 x H21.85 (inch)	W620 x D368 x H1088 (mm) W24.41 x D14.49 x H42.83 (inch)
Effective capacity	123 L (4.34 c.f.)	238 L (8.41 c.f.)
Exterior	Painted steel	
Interior	Stainless steel	
Door	Painted steel	
Shelf	Polyethylene coated steel wire Inner dimensions: Upper 2 W570 x D300 (mm) W22.44 x D11.81 (inch) Bottom 1 W550 x D235 (mm) W21.65 x D9.25 (inch) Max. load:20 kg (44.09 lb) Adjustable, 3 shelves	Polyethylene coated steel wire Inner dimensions: W570 x D300 (mm) W22.44 x D11.81 (inch) Max. load:20 kg (44.09 lb) Adjustable, 5 shelves
Access port	Inner diameter 40 mm (left side)	
Insulation	Rigid polyurethane foamed-in place	
Cooling method	Forced air circulation	
Compressor	Reciprocated compressor	
	Output; 150 W	Output; 250 W
Evaporator	Fin and tube type	
Condenser	Wire and tube type	
Refrigerant	R-134a	R-404A
Defrost heater	141 W	218 W
Temperature controller	Microprocessor, PID control (compressor; ON-OFF)	
Temperature display	Digital display	
Alarm	High temp. alarm, Low temp. alarm, Independent over-heat/over-cool limiter	
Remote alarm contact	Capacity; DC30 V, 2 A	
Program function	12 steps, 1 to 99 repeating or unlimited, Max. 10 programs memorized	
Memory backup	Nonvolatile memory	
Lamp	1 fluorescent lamp (FL15D) 15 W (turned on when the set temp.+5～50°C only)	
Accessories	2 rubber caps for access port, 3 shelves, 8 clips	2 rubber caps for access port, 5 shelves, 20 clips
Weight	78 kg (172 lb)	108 kg (238 lb)
Optional components	Spacer for stacked module for MIR-154 only (MIR-S154SB) Key mounting plate (MIR-LP), Light add-on kit (MIR-L15), Recorder fixture (MLR-S144) Shading glass protection (MIR-154BP/MIR-254BP) Communication terminal (MTR-480C)	

Note： Design or specifications will be subject to change without notice.

PERFORMANCE

Model	MIR-154					
Control range	-10～+60°C（ambient temp.：+5～+35°C、no load）					
Temperature fluctuation	±1.5°C ON-OFF control（set：5℃、ambient temp：20℃、no load） ±0.2°C PID control （set：50℃、ambient temp：20℃、no load）					
Temperature uniformity	±0.5°C（set：37°C、ambient temp.：20°C、no load）					
Noise level	41 dB (A scale)					
Maximum pressure	1650 kPa					
Rated voltage	AC 110 V	AC 115 V	AC 220 V	AC 220V	AC 230 V	AC 240 V
Rated frequency	60 Hz	60 Hz	50 Hz	60 Hz	50 Hz	50 Hz
Power consumption	150 W	160 W	130 W	145 W	135 W	140 W
Environmental conditions	Ambient temperature: +5～+35°C, Humidity: less than 80%R.H.					

Model	MIR-254					
Control range	-10～+60°C（ambient temp.：+5～+35°C、no load）					
Temperature fluctuation	±1.5°C ON-OFF control（set：5℃、ambient temp：20℃、no load） ±0.2°C PID control （set：50℃、ambient temp：20℃、no load）					
Temperature uniformity	±0.5°C（set：37°C、ambient temp.：20°C、no load）					
Noise level	44 dB (A scale)					
Maximum pressure	2395 kPa					
Rated voltage	AC 110 V	AC 115 V	AC 220 V	AC 220V	AC 230 V	AC 240 V
Rated frequency	60 Hz	60 Hz	50 Hz	60 Hz	50 Hz	50 Hz
Power consumption	220 W	240 W	190 W	215 W	195 W	200 W
Environmental conditions	Ambient temperature: +5～+35°C, Humidity: less than 80%R.H.					

Note：The unit with CE mark complies with EC directives 89/336/EEC, 93/68/EEC and 73/23/EEC.
Each data of this product is measured by our standard.
All the described performances are applied for the rated supply voltage and the frequency.
Design or specifications will be subject to change without notice.

⚠ CAUTION

Please fill in this form before servicing.
Hand over this form to the service engineer to keep for his and your safety.

Safety check sheet

☐Yes ☐No

1. Incubator contents : ☐Yes ☐No
   Risk of infection: ☐Yes ☐No
   Risk of toxicity: ☐Yes ☐No
   Risk from radioactive sources:

   (List all potentially hazardous materials that have been stored in this unit.)
   Notes :

2. Contamination of the unit ☐Yes ☐No
   Unit interior ☐Yes ☐No
   No contamination ☐Yes ☐No
   Decontaminated ☐Yes ☐No
   Contaminated
   Others:

3. Instructions for safe repair/maintenance of the unit
   a) The unit is safe to work on ☐Yes ☐No
   b) There is some danger (see below) ☐Yes ☐No
   Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :
Signature :
Address, Division :
Telephone :

Product name:	Model:	Serial number:	Date of installation:
Cooled Incubator	MIR-		

Please decontaminate the unit yourself before calling the service engineer.

SANYO Electric Co., Ltd
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